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HEMORRHOIDECTOMY

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FEW people pass through life without experiencing at some time or other the discomfort associated with hemorrhoids.

It is a pathological condition about which much has been written and the earliest records give evidence that its pathology was well understood.

It is therefore strange that in this, the twentieth century, with all the refinements of surgical technique, such diversity of opinion should exist among surgeons as to the operation of choice.

There are about six causes for discomfort after hemorrhoidectomy: a tight sphincter; divulsion preceding operation; rough handling of the tissues; all forms of packing or plugging during operation; local infection; and the habit of confining the bowels for a week or ten days following operation, which is entirely unnecessary.

All patients should be examined before operation, with a view to determining the spasticity and tone of the sphincter, for when the patient is under influence of morphine, or a general or local anesthesia, it is difficult to determine the tonicity of the muscle. If, on examination, it is found that the muscle is unusually tight, cutting is the only method that will relieve pain and put the muscle at rest. This should be done after the completion of the operation.

The old method of divulsion, still in vogue in some clinics, is not good surgery, and it often leads to awkward sequelae.

I am frequently asked by patients if there isn't danger of incontinence after the removal of hemorrhoids; and this belief, fostered by laymen, undoubtedly started when a strong, rough job was the rule rather than the exception. I can quite truthfully tell them that in my own experience of twenty-five years, none of my patients suffered from incontinence as a result of this operation.

Early in my career two cases of incontinence following divulsion were referred to me, and impressed me with the gravity of this procedure. Any man who has had experience with such a case, knows how helpless a surgeon is when confronted with such a condition. I very quickly decided to avoid divulsion.

When we recall that at one time it was common practice to divulse the sphincter for any discomfort in that region, it is amazing that more cases of incontinence did not follow. A muscle, as we know, is composed of several spindle-shaped bundles, tied together by connective tissue, its integrity and tone being determined by the quality of this tissue; to damage this structure by rough dilatation is dangerous in the extreme. There is also the possibility of hemorrhage into the muscle

structure, and subsequent organization of the clot is apt to result in dysfunction. Perhaps less serious, but certainly a matter of moment to the patient, is the intense pain caused by the rupture of the muscle, which does not soon depart, and is one of the discomforts complained of by patients suffering from a roughly performed hemorrhoidectomy.

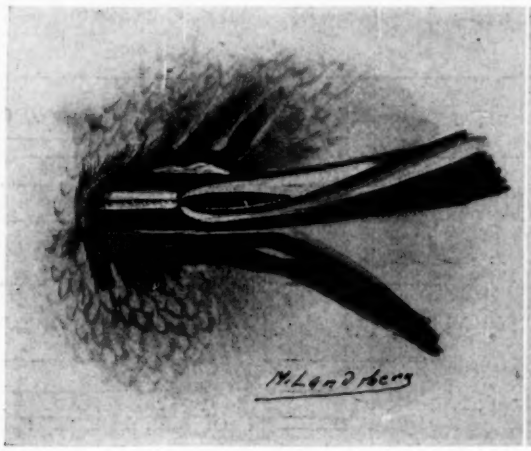

Fig. 1.

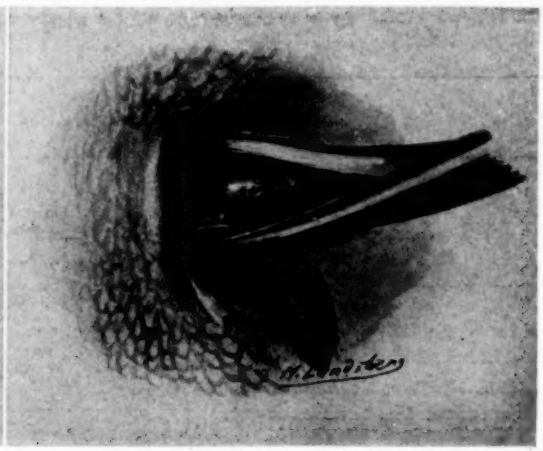

Fig. 2.

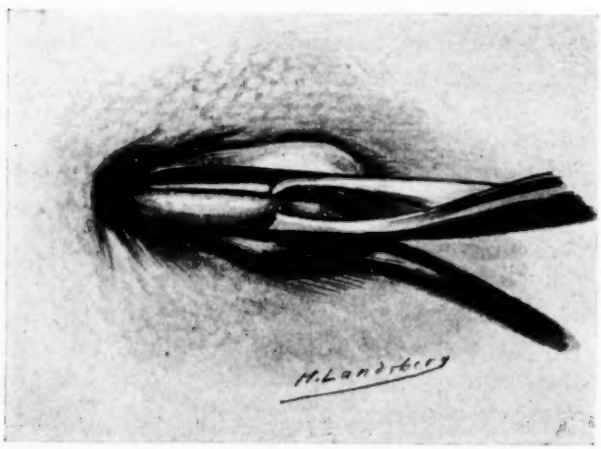

Fig. 3.

No matter how deep a muscle is cut, it can always be repaired by surgical means; but if its tone has been injured by stretching, only time can cure it.

It is a surgical axiom that the wounds heal quickest that have suffered the least damage in the tissues; therefore, gentleness is the surgeon's best aid.

Local anesthesia is responsible for much of the improved technique in rectal surgery. One must necessarily be gentle when the patient is conscious. About 95% of my hemorrhoidectomies are performed under local anaesthesia, and I find this method most satisfactory.

Local infection, as a cause of pain following hemorrhoidectomy, is commonly due to damage of the tissues at the time of operation, and can be avoided by gentleness and care. When infection occurs, it must receive prompt attention.

Fig. 4.

I am sorry to confess that early in my career I was enthralled by the plugs then in use; but I soon realized the suffering I was inflicting, and discontinued their use.

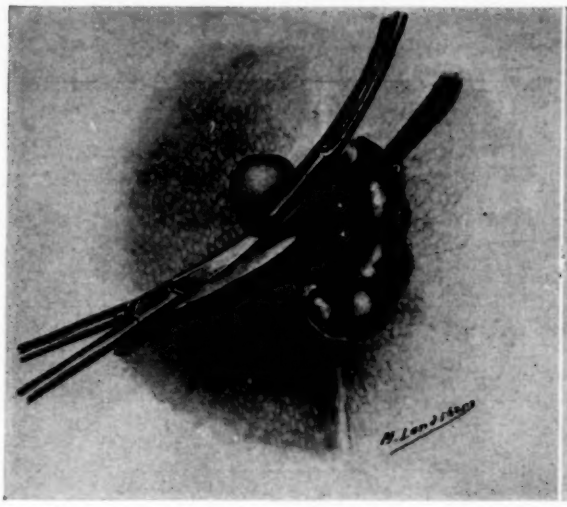

Fig. 5.

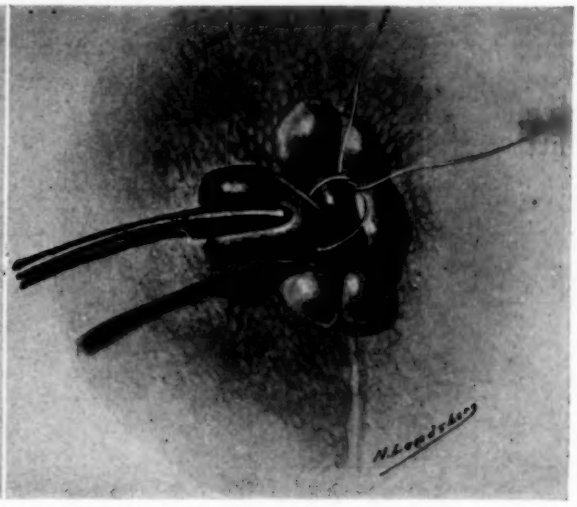

Fig. 6.

Unfortunately, my early support of this packing procedure still haunts some patients; and it is still used by the unenlightened. Packing is a vicious practice, and is responsible for more discomfort than anything else in these cases.

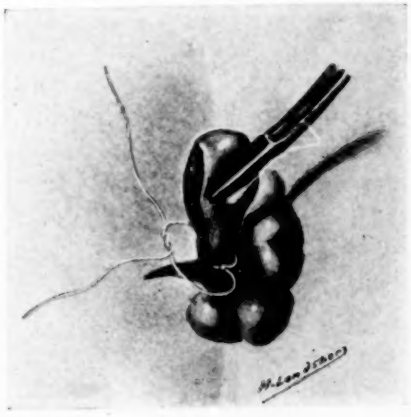

Fig. 7.

Also it is entirely unnecessary to keep the bowels confined beyond 48 hours after operation. It causes great discomfort, leads to autointoxication and infection, gives a great deal of pain when the bowels are finally moved, on account of the hard fecal masses that have accumulated, and serves no useful purpose.

There are various methods of removing hemorrhoids, each appealing to one or another group of surgeons. However, it is not the purpose of this paper to argue the relative merits of these procedures, since each surgeon is guided by his own experience and what he finds best suited to the case in hand. Some form of the ligature method has given me most satisfaction.

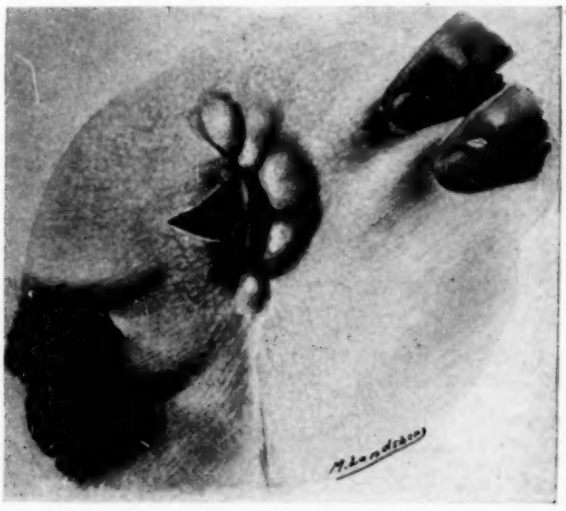

Fig. 8.

The patient is given castor oil forty-eight hours before operation; a cleaning

enema of 2% solution of peroxide of hydrogen is given the night before; about an hour before going on the table, morphine and 1/150 grain of atropine are given. At operation, the patient is placed in the left Sims' position and the hemorrhoidal area is anesthetized with 0.5% solution of novocaine. The patient being properly draped and the operative area prepared, a little ethyl chloride is sprayed on the skin about three centimeters back of the posterior commissure and in the median line and through this anesthetized area, the needle is painlessly introduced between the layers of the skin. A line from this point to the posterior commissure is anesthetized. The needle is then again introduced and passed around through the muscle on each side as far as the anterior commissure. After this, we introduce the needle at points representing 4, 8, and 11 o'clock, into the muscular wall of the bowel beneath the hemorrhoidal area.

FIG. 9.

Knowing the location of the hemorrhoids, it is unnecessary to pass the speculum in order to visualize the pile. We pass an ordinary artery forceps, lubricated, into the anus, and, with it engage one of the three or four hemorrhoids, as in figures 1 and 2. The hemorrhoid is brought forth as in figure 3. Figure 4 represents a typical delivery of internal hemorrhoids. A good cosmetic effect is always desirable, and a proper method of removing the skin tabs, with the internal hemorrhoids, is essential to get the desired result. Figure 5 illustrates this method. Figures 6 and 7 represent the two succeeding stages in the operation. Figure 8 shows the V-shaped, raw surface, from which the skin tab has been removed, with the internal hemorrhoid. Figure 9 shows how the skin approximates, and this is the object of the V-shaped incision. The same procedure is followed with each of the other hemorrhoids. Figure 10 shows the completed operation.

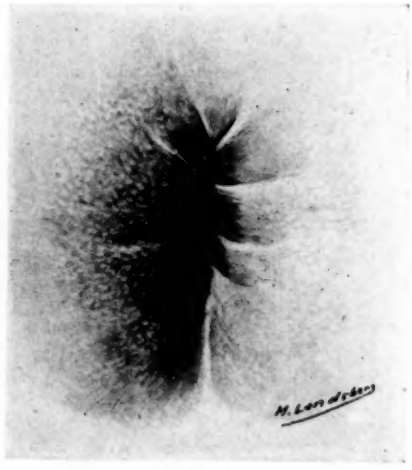

FIG. 10.

If the sphincter is tight, an incision is made in the posterior commissure and continued through the skin of the anesthetized area. All bleeding vessels are tied, and a little piece of vaseline gauze is placed in the posterior incision to prevent agglutination of the wound. Finally, an opium suppository is inserted, and the patient is returned to bed.

If he has discomfort or pain a few hours later, he is allowed to get out of bed and in a sitz bath. Nothing that I know of gives as much relief.

Forty-eight hours after operation, an oil, or hydrogen peroxide enema is introduced into the rectum through a catheter, and the patient is permitted to sit on the toilet bowl to move his bowels. He will then move his bowels regularly every day.

The stay in the hospital after this operation varies from three to five days.

BIOLOGIC ANTISEPSIS

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THERE are three methods of directly combating offensive and pathogenic bacterial infections, viz., asepsis, antisepsis and biologic antisepsis.

Asepsis is absolute surgical cleanliness. Germs are eliminated by mechanical and chemical cleansing processes and suitable protection.

Antisepsis is secured and maintained by means of chemical agents that destroy all bacteria and prevent their development.

Biologic antisepsis does not seek to eliminate bacteria but substitutes harmless, protective bacteria for pernicious, pathogenic organisms.

Although we have called it a new therapeutic method, biologic antisepsis is by no means a new discovery; it is, in fact, a very old idea, the original, natural method of combating sepsis and putrefaction. We call it new only in the sense of recognition as a distinct and systematized procedure.

Every infection is an indication for a change of flora. Change of the intestinal flora is not a reduction of the number of bacteria, but an exchange of pernicious putrefactive, poison-forming, "wild" (Herter) bacteria for the normal, protective flora by restoring the harmless, acid-forming germs which nature implants soon after birth in the intestine of every young mammal. An infected wound, an abscess, a chronic ulcer, a foul-smelling sore, is a lesion that demands a change of flora just as does a colitis.

When Lister introduced the use of the carbolic acid spray to combat sepsis in surgery, the amazing and revolutionary results, inspired hope that a panacea for troubles due to infection had been discovered. Suppuration of wounds had previously been regarded as a normal process so long as the pus was "laudable." "Pus buckets" stood by the bedsides to receive the pus from dripping stumps suspended over them, and were emptied as regularly as the sap buckets in a maple sugar bush. No surgeon ventured to close a wound without drainage. A surgical ward was often as malodorous as a slaughter-house. The Lister spray changed the odor to that of carbolic acid and greatly lessened suppuration and gangrene; but evidence of carbolic acid poisoning was not infrequent and healing was delayed. Other chemical antiseptics were tried with varying results. Within the last forty years hundreds have been tried and rejected, and the search for a harmless chemical antiseptic still goes on. The great number of different chemical antiseptics employed in surgical practice is sufficient evidence that none is wholly satisfactory.

The reason for the acknowledged failure of chemical antisepsis is not far to seek. The bacteria that we endeavor to combat by chemical poisons are living cells. The tissues that we desire to protect are likewise living cells. It is evident, then, that when chemical antiseptics are brought in contact with the tissues, not only germs but connective tissue cells, delicate nerve filaments, and most of all the leucocytes—which form the front line of the brigade of tissue builders—are damaged as well as the bacteria present in wound infections. Any chemical agent that will destroy bacteria will certainly damage the far more delicate and vulnerable white blood cells which are the chief factor in all healing and tissue-repairing processes.

Because of these evident facts, many surgeons have wholly abandoned the use of antiseptics and germicides in surgery, except as cleansing agents, and depend upon asepsis instead of antisepsis. Asepsis has become, in fact, the classical method,

and one seldom sees nowadays anything resembling the elaborate chemical technic in general use twenty or thirty years ago. We are learning to respect the deft and marvelously efficient natural methods by which the tissues defend themselves against the attacks of bacteria as well as other agents hostile to the interests of the body. Much progress in many branches of scientific medicine has been made in recent times by recognizing, imitating, and in various ways aiding the natural processes of cure.

The underlying principle of biologic antisepsis is prophylaxis. By the establishment and maintenance of a normal environment for the body cells, their resistance is so reenforced that they are able to recover and retain the normal status. Nature's method is positive rather than negative. She prevents offensive and pathogenic organisms from developing by maintaining a luxuriant growth of harmless, aciduric organisms that produce conditions inimical and inhospitable to disease-producing bacteria.

That certain carbohydrates render invaluable aid in the creation of conditions favorable for the defense of the organism, as demonstrated by bacteriological experts, is a biologic fact which we are only just beginning to appreciate. Through the efforts of Tissier, Metchnikoff, Diasto, Herter, Kendall, Torrey, Rettger and others, the profession is just beginning to recognize the importance of changing the intestinal flora and keeping it changed through the reestablishment of the normal protective bacterial growth in the intestinal tract.

A few years ago, Wright of London called attention to the beneficial influence of hypertonic salt solutions through causing an outpouring of lymph with its healing enzymes, antibodies, lysins, opsonins and leucocytes. It is the purpose of this brief paper to call attention to another natural or biologic method of combating sepsis and promoting the healing of lesions due to infection, which offers the advantages of the Wright method and is far more efficient, and which applies to external conditions an antiseptic method the potency of which has been long established in dealing with internal conditions,—a method which is purely biologic in its mode of action. This biologic method is based on the following simple, well-known facts:

Certain parts of the body, though the most exposed to infection, are the least subject to attack by infectious disease. This is particularly true of the stomach, in which pathogenic organisms are rarely found so long as it continues to make hydrochloric acid. The contents of the colon and the secretions of the vagina are normally acid, and so long as this acid condition is maintained, infection rarely occurs. The stomach is protected by the acid gastric juice, the colon and the vagina by an aciduric flora which Nature provides for the purpose,—the *b. acidophilus* in the colon, and *b. döderlein* in the vagina. Kendall tells us that aciduric bacteria possess "the unusual property of growing in fermentation media of a degree of acidity incompatible with the development of *all other known bacteria*."

In the normal nursing infant, the stools are slightly acid and altogether nonputrefactive. This is due to the six or seven per cent of lactose in the mother's milk. When the diet of the child is changed so that the intestinal residues contain no lactose and much putrescible material, the aciduric flora and acid products disappear, and putrefactive and pathogenic bacteria with alkaline products take their place. To restore the aciduric flora, it is only necessary to supply to the colon the sort of carbohydrate required by acidophile bacteria, and they quickly reappear. Nature supplies the culture to the adult just as she does to the infant. Carbohydrate is the natural protective means by which putrefaction is prevented. It is for this reason that milk sours, while meat putrefies. The Bedouins preserve meat by immersing it in camel's milk. I preserved a beefsteak intact and free

from taint in buttermilk for seventeen years. Lactose is the real protective agent.

An infected wound, an open sore, or a suppurative cavity, is in a condition similar to that of an infected colon. In every wound there are putrescible substances, dead cells, fragments of tissue and lymph, and no protective carbohydrate, and if pathogenic and putrefactive bacteria are present infection and putrefaction are likely to occur. This is, in fact, what happens unless special precautions are taken to avoid contamination. Chemical agents of various sorts will, of course, prevent bacterial growth, but they also tend to hinder healing.

By the employment of a simple biologic method, the development of pathogenic bacteria may be prevented and healing promoted instead of hindered. All that is needed is to supply suitable carbohydrate to the exposed surfaces. The effects are of two distinct orders. First, the concentrated, highly soluble carbohydrate causes an outflow of serum or lymph from the denuded tissues. The effect of this bathing of the exposed tissues with fresh lymph is most salutary. Bacteria are destroyed, damaged cells are repaired and the growing tissues are fed. Second, the carbohydrates applied render impossible the development of putrefactive or pathogenic species of bacteria and, being non-toxic, they do not in the least interfere with natural healing processes. Pernicious organisms simply cannot grow in the presence of a liberal amount of carbohydrate of a sort readily available as nutrients for acid-forming bacteria. Under such conditions, wound infection cannot occur, chronic ulcers rapidly heal, infected wounds become sweet and clean over night, and suppurating cavities dry.

The best carbohydrates for the purpose are lactose and dextrin so blended as to make a smooth and adhesive magma when water is added in right proportion. I have made use of this simple but most effective biologic antiseptic for some years with most gratifying success. Following are some of the conditions in which biologic antisepsis has been found serviceable:

OFFENSIVE DISCHARGING WOUNDS OR SORES

The effect of a carbohydrate dressing applied to a foul-smelling sore or wound is shown by the following case.

Mrs. A., aged 50 years, was brought to the hospital (B. C. Sanitarium Clinic), suffering with cancer of the left breast. The breast had been removed, but the disease had returned, and had extended until it covered a nearly circular area five to six inches in diameter. The whole surface was covered with putrid, sloughing masses of flesh from which issued a copious discharge. A penetrating and disgusting odor arose from the sore, which made the care of the patient most disagreeable for physician and nurses. The dressing was applied at night and the next morning the offensive odor had wholly disappeared. In a few days the appearance of the diseased area had greatly improved. Pain was relieved and the patient's condition greatly ameloriated, although no hope of a cure could be entertained. The local extension of the disease seemed, indeed, to be slowed, although numerous metastases which had already developed were, of course, uninfluenced.

The method is equally applicable in cases of gangrene. I have employed it with most satisfactory results in cases of diabetic and of senile gangrene. Other therapeutic measures, diet, insulin, light rays, etc., were, of course, employed, but the simple painless, inoffensive, emollient, carbohydrate dressing, seemed to aid the healing process and was a real comfort to the patient.

In cases of advanced cancer of the uterus, with the usual offensive discharge that makes miserable the lives of the patients' friends as well as their own, biologic antisepsis is a veritable boon. A liberal application of the carbohydrate every day or, in mild cases, every other day, will wholly eliminate the unpleasant odor and lessen the discharge. The external irritation resulting from the discharge quickly dis-

appears and the patient no longer suffers ill-effects from the absorption of putrefaction products. The tampons, when removed, are odorless or slightly sour instead of having the usual disgusting odor of putrefying flesh.

VARICOSE ULCERS

Chronic sores, such as indolent or irritated varicose ulcers, generally heal rapidly under dressing with a paste prepared by mixing the dry carbohydrate with twice its volume of water. When there is much serous oozing, the dry powder is preferable.

OPERATION WOUNDS

The carbohydrate dressing is equally effectual for treating infected operation wounds that heal slowly. Exposure to the sunlight or to the rays of an arc lamp daily, or twice a day, greatly expedites the healing process. Applied after operation this dressing affords perfect protection against sepsis.

COLOSTOMY WOUNDS

When freely applied to wounds or openings that communicate with the intestine, the offensive odor usually present is practically eliminated. The excoriation of the skin that develops around such openings is prevented, and healing is greatly facilitated. Recent wounds, the healing of which is prevented by contamination with fecal matter, take on almost at once a healthy appearance under this carbohydrate dressing.

For several years, I have made use of carbohydrates in gynecological practice. Of a great number of agents, old and new, none has proved so valuable. In simple vaginitis, with or without erosions of the mucous membrane, the lesions disappear, often with almost incredible rapidity. When cervicitis with erosions of the *os uteri* exists, as is often the case, the cervicitis must be dealt with by more radical measures, as by the use of ionization, diathermy, electro-cautery or enucleation, according to the indications in each individual case, although in most cases, there may be observed marked improvement in the cervicitis, a lessening of the discharge, and often almost complete disappearance of granular erosions. When the erosion is superficial, it will disappear in a few days. I recall two cases sent to me two years ago (1924) by physicians with a diagnosis of cancer of the cervix, in which the lesions disappeared completely in less than a week and have not returned. In one of these cases I had removed a cancerous uterus a year before by vaginal hysterectomy, and the sore that appeared at the site of the operation gave rise to a bloody discharge and certainly had a most suspicious appearance; but after a week's carbohydrate treatment, no trace of it could be seen, and it has not reappeared.

PRURITUS VULVAE AND ANI

When the pruritus is due to an infective discharge from the vagina or rectum, as is often the case, relief may generally be obtained by cure of the discharge by the use of biologic antisepsis. In cases of vaginal discharge, this is accomplished by daily hot irrigation, followed by tamponade with gauze, after introducing half an ounce of the dry carbohydrate.

In cases of proctitis, the rectum is irrigated daily with a hot salt solution (teaspoonful to the pint, 120° F.), and two or three ounces of carbohydrate paste (equal parts of the dry powder and hot water) are injected into the rectum to be retained.

The pruritus may be promptly relieved by touching with a napkin moistened with boiling water. The contact should be brief enough to avoid blistering. A temperature of 120° F., or above, is powerfully analgesic. Such applications, repeated for five or six minutes, will afford relief usually for several hours in pruritus either with or without any skin eruption.

BIOLOGIC ANTISEPSIS IN OBSTETRICAL PRACTICE

The bacteriologists have shown us how nature protects the vagina from infection

by maintaining an acid condition of its secretions by developing an aciduric flora. The alkaline secretion of the cervix uteri renders it more vulnerable, and it is in the cervical canal rather than in the vagina that pathogenic organisms like the gonococcus and streptococcus are implanted. In most cases of chronic vaginal discharge, the source is found to be the cervix rather than the vagina. As soon as the infection of the cervix is cured, the vaginal discharge usually disappears.

At one period, some time after the introduction of the carbolic acid spray into surgery by Lister, chemical antiseptics were quite extensively used in obstetrical practice, but the results were so unsatisfactory that at the present time most obstetricians prefer careful asepsis to the use of chemical agents of any sort. That asepsis, even when conducted in the most conscientious and thorough-going manner possible, is not altogether satisfactory, however, is clearly shown by the frequent development shortly after confinement of symptoms evidently due to infection. One of the mildest and most constant of these is the lochial discharge which is so constantly present that it is regarded as physiological. A frequent slight rise of temperature, the so-called "milk fever," to say nothing of "milk leg," and other still more serious complications, are clearly due to bacterial infection.

It is easy to understand why infection occurs, for it must be rare, indeed, that a child is born without the mother undergoing more or less laceration of the tissues, quite sufficient to open the door for the entrance of streptococci and other pus-producing organisms. A hardy savage woman possesses such a high degree of resistance that she is protected by natural immunity, but a civilized woman is by no means so well prepared to resist the invasion of parasitic organisms, and hence is more liable to infection. The parturient woman is, in fact, especially liable to infection, not only because of the numerous ruptures in the protecting mucous membrane of the vagina, but because the normal acidity of the vaginal secretions is displaced by alkalinity during the lying-in period; evidently, this menace should not be disregarded.

If a woman not pregnant should receive by accident the same sort of injuries to the vaginal tissues that occur at childbirth, her wounds would be treated in precisely the same manner as though they had occurred in any other part of the body, and especial care would be taken to avoid sepsis. The laws of nature are not set aside in behalf of the lying-in woman. She enjoys no exemption from liability to infection. Why, then, should not a woman who has given birth to a child have the benefit of the same careful technic to combat infection as would be used under ordinary conditions?

After watching the work of Kister at King's Hospital, London, nearly forty years ago, and adopting his methods in dealing with surgical cases during and after operation, it occurred to me to apply the same methods to obstetrical cases. I was at first deterred from so doing by the apprehension that harm might result from interference with the lochial discharge. When I mustered up courage to make the attempt, however, I was greatly surprised to find that with antiseptic dressing little lochial discharge appeared. Neither was there the usual slight rise of temperature during the few days immediately following confinement.

Several obstetricians who, at my suggestion, have tried the method of biologic antisepsis, have reported most excellent results. The lochia is very greatly diminished or wholly absent, the patient has no rise of temperature, the so-called milk fever does not appear, nor other complications commonly experienced by lying-in women as the result of infection. The only objection to the use of antisepsis in obstetrics has been the possible injury through the absorption of the chemical agents employed. This objection does not apply to biologic antisepsis, which does not interfere with any natural function,

promotes healing and renders the lochia less necessary by suppressing the development of pathogenic bacteria.

The method of application in obstetrical practice is very simple. After thoroughly cleansing the parts following the delivery, and repair by proper suturing of all tears, two or three ounces of dry powder are introduced into the vagina and retained by tamponade with several feet of plain, two-inch gauze. The best method of introducing the powder is the following:

Holding the blades of a closed speculum in the left hand, fill the cavity between them with the dry carbohydrate, then place the speculum; open the blades in the usual manner, and insert the gauze packing. If necessary, two or three lengths of gauze may be used for the first two or three days. The quantity of powder introduced at each dressing should be at least half an ounce. Change the dressing daily for a week, irrigating the vagina with a one per cent salt solution, at a temperature of 115° F.

It is my belief that if biologic antisepsis were universally employed by obstetricians, the perils and inconvenience of child-bearing would be so greatly reduced that the ordeal would be regarded with much less apprehension by potential mothers, and the birth-rate would probably be materially increased.

PROCTITIS AND COLITIS

Chemical agents can render little service in the treatment of proctitis and colitis for the reason that they destroy the protective flora as well as the infecting organism. Nature's mode of protecting the intestine is not to keep it free from bacteria but to maintain a harmless acid-forming flora, by this means rendering the territory inhospitable to putrefactive and pathogenic organisms, just as we keep our front lawns free from weeds by maintaining a vigorous growth of grass which completely occupies the soil.

The protective flora are more easily destroyed than the pathogenic organisms because the latter are to a large extent spore-bearing and hence highly resistant; so when chemical antiseptics are employed, the colon is left wholly without protection from infection by pathogenic organisms which quickly restore the pernicious flora when the immediate effect of the antiseptic application has passed off. The situation is the same as that of a lawn that has been newly plowed or spaded. The ground is bare and weeds quickly make their appearance.

Colitis and proctitis are due to infection, and the only way a real cure can be accomplished is by changing the flora; that is, the infecting organisms must be got rid of and the normal, aciduric flora must be established in their place. This cannot be done by merely introducing, either directly or indirectly, *b. acidophilus*, *b. bifidus*, or other acidophile organisms. More important, even, than the introduction of cultures, is the provision of suitable nutrient media. For this, carbohydrates are absolutely essential. All carbohydrates are good, but lactose and dextrin have been shown to be by far the best for the purpose. When these are introduced daily into the colon in sufficient quantities, they supply the condition fundamentally necessary for the developmnt of protective flora. This done, the protective organisms quickly develop. Nature attends to this without assistance. It is no more necessary to introduce acidophile cultures into the interior of the body in order to develop an aciduric flora than it is to inoculate milk with sour milk germs in order to cause it to sour. Lactic acid-producing organisms are everywhere present in vast numbers. A solution of carbohydrates left to itself always sours through the growth of acid-forming organisms that require oxygen, the ordinary sour milk germs. A solution of carbohydrates within the body also sours, but through the development of acid-forming organisms that are able to grow in the absence of oxygen. Nature supplies these organisms, *b. acidophilus*, *b. bifidus*, etc., just as freely and promptly as she

does the germs that sour milk. The only essential thing is the carbohydrate in solution.

For fifteen years I have been treating proctitis and colitis by injecting into the rectum and the colon liberal quantities of lactose and dextrin in solution after first cleansing the colon with enemas, repeated as often as necessary, with water at a temperature of 112° to 118° F. Very hot water is necessary to relieve colonic spasm and to stimulate a healthy action of the infected mucous membrane. The introduction of lactose and dextrin in solution into the rectum or lower bowel, provides a nutrient medium suitable for the development of a luxuriant protective flora whereby the growth of pathogenic organisms is prevented, while the repair of damaged cells and tissues is encouraged.

If is, of course, essential in cases of colitis and proctitis, that the upper part of the intestinal tract as well as the lower colon, should be freed from putrefactive and other pernicious bacteria. This can be accomplished only by such regulation of the diet as will eliminate putrefactive residues while supplying the colon with the carbohydrates necessary to encourage the development of a protective flora; that is, by changing the intestinal flora. By the thorough-going application of these measures, I have seen many hundreds of persons suffering from colitis and proctitis rapidly restored to health.

In some extreme cases in which the greater part of the colon has become diseased, a cure may be greatly accelerated by appendicostomy, which renders possible thorough irrigation of the colon once or twice a day, with a hot, normal saline solution, followed by an emollient carbohydrate solution, thus putting the diseased area in the best possible state of defense against the invading organisms.

SUPPURATING CAVITIES AND WOUNDS

While well drained cavities have a very strong tendency to heal, the healing process is sometimes greatly delayed or even arrested. In such cases, especially when there is a profuse discharge of pus, biologic antisepsis proves highly serviceable. After cleansing with a warm, normal saline solution, the abscess cavity is irrigated with the carbohydrate solution, four ounces to the pint.

In the case of suppurating wounds, the wound should be covered with the powdered carbohydrate after washing with hot, normal saline solution, at 105° F.

Chronic discharges from the ear generally disappear under daily treatment with carbohydrate. After cleansing the ear thoroughly with a hot normal saline solution, the cavity is packed with the dry carbohydrate, which is held in place with a little cotton.

In cases of ozena and offensive nasal discharges, the dry powder should be introduced into the nasal cavity by free insufflation, after cleansing the cavity with a spray or careful irrigation with a warm saline solution, two ounces to the pint.

SKIN ERUPTIONS

Cases of chronic eczema often recover with surprising rapidity under the use of suitable carbohydrates, which should be employed both externally and internally; internally, in connection with an antiseptic diet to change the flora and keep it changed; externally, to combat the local bacterial process.

Itching may be completely relieved by very hot applications as suggested for pruritus ani. The relief afforded by these very hot applications is instantaneous and usually lasts for several hours, often an entire night. The hot applications are not only palliative but curative. They stimulate normal cell activity. It has recently been shown by Roucayrol of Paris, and other French investigators, that high temperatures (117° to 120° F.) promote cell rejuvenation and encourage the development of immunity.

For local applications, a magma is prepared by adding to the dry carbohydrate twice its volume of boiling water. All the water should be added at once and the mixture should be stirred rapidly until smooth, then spread on a soft cloth and applied to the affected surfaces like a poultice. The whole is covered with mackintosh to prevent evaporation. The dressing is changed morning and night.

In cases of acute erythema such as ivy poison, sunburn and other acute affections of the skin, prompt relief is obtained by hot applications followed by a carbohydrate poultice.

Eczema and other eruptions of the scalp generally yield to hot applications made in the manner described, followed by a carbohydrate poultice (see the foregoing), which should be applied at night on going to bed. It may be removed in the morning. In very obstinate cases, the poultice should be employed both day and night.

In this paper I have sought to show that the method of combating pathogenic organisms by means of carbohydrates may be applied to external as well as internal conditions, and with an equal degree of success. It cannot be claimed of course, that carbohydrates constitute an infallible preventive of sepsis, but the field for the application of biologic antisepsis, external as well as internal, may be larger than we at present apprehend it to be.

SUMMARY

1. Biologic antisepsis is the natura method of combating sepsis.

2. Its underlying principle is prophylaxis—the prevention of the development of putrefactive and pathogenic organisms by the maintenance of a vigorous growth of aciduric organisms.

3. It has been demonstrated by bacteriological experts that certain carbohydrates render invaluable aid in creating and maintaining the conditions most favorable for the defense of the organism from pathogenic bacteria.

4. The best carbohydrates for this purpose are lactose and dextrin so blended as to make a smooth and adhesive magma when water is added in the right proportions. This combination makes a simple but most effective biologic antiseptic.

5. Biologic antisepsis is of equal value in both internal and external conditions, and has been used with success in the following conditions: Offensive, discharging wounds or sores; varicose ulcers; operation wounds; colostomy wounds; pruritus vulvæ and ani; proctitis and colitis; skin and scalp affections; also in gynecological and obstetric practice.

PRECAUTIONS AGAINST POSTOPERATIVE ACIDOSIS IN CHILDREN*

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AS a frank and fitting introduction I quote the words of Montaigne: "I have gathered a bouquet of other people's flowers and only the thread that holds them together is my own."

It was not intended and I am sure it is not desired, that I enter into a detailed discussion of acidosis from its many angles. What I hope to offer are some suggestions from the pediatric standpoint that will prevent or minimize the occurrence of this condition after operations for non-acute surgical conditions requiring general anesthesia. At the same time, I have included an outline of the symptoms of, and measures for combating, the condition as early and as promptly as possible, because I feel that such information should be possessed by hospital interns and nurses. Before proceeding with the subject proper, it is manifestly important that we analyze such factors as give rise to the condition, the mechanism of its production, the circumstances under which it occurs, the relation to it of a proper food balance or ratio and of fasting, the general condition of the patient prior to operation, the condition of the kidneys and the circulatory apparatus, muscular activity, essential laboratory findings, and finally the question of anesthesia and surgical shock. Before we are in a position to formulate ways and means for preventing or controlling preoperative and postoperative acidosis it is but natural that we possess definite reasons, if possible, for our method of approach.

I am stressing the word *condition* in connection with acidosis because I wish to emphasize that the diagnosis of acidosis as such is made all too commonly and too loosely as implying a definite disease or entity. The truth is that acidosis is merely a symptom-complex, a state, a superimposed condition, a result, and not a cause or a disease any more than fever and coma are diseases. But just as fever and coma may be controlled or prevented by appropriate remedial and prophylactic measures, so acidosis can be largely prevented or controlled in the preoperative and postoperative states. I say largely, because the causes of postoperative or better post-anesthesia acidosis have not as yet been definitely established as we shall see and occasionally, despite all our efforts, acidosis will occur under these circumstances. If, however, reasonable precautionary measures are instituted in the preoperative, operative and postoperative periods, we will have the assurance that our full duty has been performed.

Not alone is acidosis not a disease or an entity, but the very term itself is a misnomer. First used in clinical medicine by Naunym in 1906, it is one of those misnomers that have crept into our medical nomenclature and which custom and usage have fastened upon us. Literally, it conveys the idea of an acid condition of the blood and tissues—a state of affairs incompatible with human life.

As defined by L. J. Henderson acidosis is "a disturbance of the acid base balance of the body in the direction of a diminished ratio of base to acid. Since the body maintains a surplus or reserve of base, acidosis becomes a diminution of the body alkali." Acidosis in simple terms is a diminished alkalinity of the blood and tissues, a lowering of the alkali reserve of the body caused by abnormal production or retention of acids, a reduction of the sodium bicarbon-

* Read at a meeting of the Clinical Society of the Hospital for Joint Diseases.

ate content of the blood below the normal level.

Let us consider the salient features of the mechanism of acidosis as stated by Talbot, Shaw and Moriarty in their studies of children who underwent a voluntary fast:

During health the heat energy of the body is derived principally from the combustion of the carbohydrates and to a lesser degree from fat and protein. Under these conditions there is, of course, a great excess of antiketogenic material. During a fast, however, as no carbohydrate is obtained from food the store of available carbohydrate in the body is quickly exhausted. Confirmatory evidence of this is found in the low blood sugar concentration found in children who are fasting. The heat energy then must come from fat and to a much less extent from protein. The balance is now thrown in the other direction, and there is a great excess of ketogenic material which is not entirely compensated by the small amount of carbohydrate obtainable from the proteid. There is, in consequence, a great production of ketones. The ketone acids then combine with the alkali of the blood and reduce the carbon dioxide combining power. This decrease in the alkali reserve is accompanied by a diminished alkalinity of the blood as shown by the ph. If this sequence of events is correct then acidosis during fasting with non-diabetic children is due to a lack of available sugar which is manifested by a low sugar content.

Howland and Marriott state:

Acidosis is a process which results in the depletion of the fixed alkalies of the body. During the course of normal metabolism considerable amounts of acid are produced, such as carbonic, phosphoric and sulphuric as well as certain organic acids. Under normal conditions the body is able to eliminate these acids or to neutralize them with ammonia, so that there is no depletion of the reserve of fixed alkalies in the blood and tissues. If, however, acids are produced in excessive amounts, if the mechanism of elimination and neutralization fails, if there is an excessive intake of inorganic acid or insufficient intake of bases the alkali reserve may be drawn upon and when this occurs the condition of acidosis may be said to be present.

There is nothing more constant in the human organism than the reaction of the blood. Large amounts of alkali or acids may be added to this vital fluid without marked change in its reaction. Any infringement upon the normal alkalinity is met with by the body defences and in the production of acids from whatsoever cause —exercise, improper food balance, defective metabolism, fasting, disease, infection, anesthesia, shock, poisons, burns— an effort is made to neutralize them by the buffer action of sodium bicarbonate, inorganic phosphates, protein and hemoglobin and to remove them by oxidation, or elimination through the lungs, the kidneys and the intestines in the form of carbonic acid, fixed acids and phosphates, respectively.

When, however, because of marked disturbance of food balance, faulty metabolism, defective function or elimination, or other cause, the buffer action, oxidation or eliminative factors are overcome, a diminution in the alkali reserve, or acidosis, occurs. In other words, acidosis may be caused by abnormal production, excessive retention or faulty elimination of acids, and may be classified broadly, according to Means, as (1) metabolic (2) elementary and (3) retentive.

Under normal conditions the reaction of the blood is maintained by the ratio of the amounts of free to combined bicarbonate. If acids accumulate in the blood and tissues (by reason of food imbalance, exercise, disease, poison, anesthetic, etc.) in amounts sufficient to neutralize part of the bicarbonate, the latter is excreted chiefly by the lungs as carbon dioxide and its amount is reduced in the blood and tissues proportionately. The estimation of the bicarbonate content of the blood as indicative of the alkali reserve is determined generally by the Van Slyke method which measures the amount of carbonic acid gas which exists in a unit sample of blood serum. Under normal condition 50–65 cc. of carbon dioxide per 100 cc. of blood are found. In mild acidosis 40–50, in moderate cases 40–30 are found. Below 30 is considered a severe acidosis and under 25 dangerous and often fatal. The principal source of the acetone bodies in the blood and tissues is the fats which when broken down in the absence of a sufficient supply of glucose, burn

only to acetone bodies and not as normally to carbon dioxide and water. What this relationship is that renders the burning of carbohydrates essential to the proper catabolism of the fats is not at present known, but it exists and fairly quantitative relationships can be demonstrated. The old saying is a true one, that fats burn in the fire of the carbohydrates. (Palmer and Ladd.)

If the appearance of ketone bodies in the blood and urine of children is to be avoided there must be a certain ratio of antiketogenic to ketogenic substances in the food. On this subject I quote Wilson, Levine and Rivkin (*American Journal of Diseases of Children*, March 1926).

In adults authorities agree that a significant ketonuria rarely occurs at fatty acid-glucose ratio of less than 1.5 (ketogenic-antiketogenic ratios below 1). Ketoacaids appeared in the urine of all children at fatty acid-glucose ratios of 0.7. In children, therefore, the fatty acid-glucose or keto-antiketogenic ratios are lower than in the adults, and a significant ketonuria appears in children at consistently lower metabolic fatty acid-glucose ratios than in adults. Furthermore, children excrete a relatively greater quantity of ketone bodies at a given metabolic ratio above the threshold of ketosis. This fact may explain the more rapid development and the greater severity of ketosis in children than in adults. Children ordinarily require the simultaneous oxidation of relatively more ketolytic to ketogenic substances than adults in order that the accumulation of intermediary ketone bodies may with certainty be prevented. This may be the factor which makes children especially sensitive to ketogenesis. Clinically the tendency of children to develop ketosis may logically be counteracted by giving diets high in carbohydrates and low in fat, especially in conditions associated with an elevated metabolism. Normal children vary in the relative extent to which they utilize the different foodstuffs. They have in common, however, the fact that carbohydrate, irrespective of its source, displaces fat from the metabolic mixture, relegating it presumably to the tissues for storage. Expressed in another way normal children ordinarily are "carbohydrate burners."

The normal diet for an individual of average weight of 70 kilos, during ordinary activity, consists of approximately 400 gms. of carbohydrate, 100 gms. of protein and 100 gms. of fat—a caloric estimation of about 3000. The dietary requirements of the normal child, in order to maintain a ketogenic-antiketogenic balance, are best served by a food ration of 60 percent carbohydrate, 25–30 percent fat and 10–15 percent protein. Thus a child of 6–7 years of age weighing 45 lbs. and requiring approximately 1500 calories would need 225 gms. of carbohydrate (900 calories) 45 gms. of protein (180 calories) and 50 gms. of fat (450 calories)—a combination well within and below the danger limit of ketosis.

Acidosis or ketosis is a common occurrence in childhood. In point of fact children are notoriously more sensitive to this condition than adults and often trivial errors of diet or minor diseases which would have no effect upon the adult economy will produce acidosis in children. It was natural then that pediatricians should turn their attention to this subject. In fact, within recent years a considerable literature on the subject has accumulated, and it is from the writings of many authorities, Talbot, Shaw, Moriarty, Schloss, Howland, Marriott, Cowie, Smith, Dennett, Gamble, Blackfan, Wilson, Levine and Rivkin, and others—that I quote the following as having direct bearing upon the subject.

1. The great production of ketones is dependent upon a diminution of the available sugar in the child's body.

2. The younger the child the more rapidly the glycogen reserve of the body is apparently depleted.

3. Fasting children show a lowered blood sugar content, often as low as 45 mg. per 100 cc. of blood, and hypoglycemia is more common in them than in the fasting adult.

4. The ability to store glycogen is reduced in children subject to ketosis.

5. The carbon dioxide-containing power of the blood is as low as 21 in starving children.

6. A large depletion of the body fluids may have the same effect as damage to the

kidneys in that there is a deficient secretion of urine.

7. It appears that some children react more rapidly and more sharply than others to acidosis and this may be an explanation for the occurrence of certain of the attacks of recurrent vomiting.

8. The nervous reaction of the individual child plays a part in many cases of ketosis with vomiting, and bromides per rectum, in addition to glucose, has secured in the hands of Charles H. Smith control of symptoms much more quickly than carbohydrate alone.

9. So long as children took large amounts of fluid they had no symptoms of acidosis.

10. It was borne in on us more and more that the glycogen reserve of the body, from the clinical point of view, is the factor that is going to assume considerable importance, and it must be considered in the treatment of cases. Children, especially, should not be operated upon for diseased tonsils or adenoids or other conditions without preparing them for operation by administering glucose and as much fluid as possible. Better results in postoperative treatment have been obtained than before the ketogenic balance was taken into consideration. (Talbot.)

11. Acetone and diacetic acid are not present in amounts proportional to the severity of the symptoms or to the degree that the carbon dioxide tension of the blood is reduced. In a certain number of severe cases of acidosis these bodies may be entirely absent; and the presence of small amounts of them must be considered as having no significance.

12. One must not lose sight of the fact that acidosis due to the acetone bodies is only one of several types commonly occurring and that severe and fatal acidosis frequently occurs when there is no overproduction of acetone bodies and when they cannot be detected in the urine.

13. Water should be given in large amounts so that it can be absorbed as rapidly as possible in order to overcome the effects of the unknown acids that play an important part in the production of acidosis.

With these phases of the subject as our background we are prepared to approach understandingly the preoperative, operative and postoperative precautions against acidosis in children or, as Glass and Wallace put it, "preoperative treatment for postoperative comfort." Much that has been said bears a direct relationship to preoperative care—the great susceptibility of children to ketosis, the part which the nervous mechanism of the child plays in its production, the danger of previous fasting or purgation, the need for supplying a liberal quantity of carbohydrates in order to increase the glycogen reserve, the administration of large quantities of fluids, the importance of preliminary rest and quiet and the avoidance of excitement, the preoperative physical examination and the examination of the urine, the tendency for infections of all kinds, even an insignificant rhino-pharyngeal involvement, to produce acidosis. All these must be taken into consideration prior to operating upon a child.

The question of muscular activity, oxygenation and cardio-respiratory or circulatory disease or disturbance have an important bearing upon the question of acidosis from the operative and postoperative standpoints when a general anesthetic is used. S. W. Clausen says:

> Under normal conditions of activity, circulation, and oxygenation, the removal of lactic acid is so rapid that the alkali reserve of the body as a whole remains practically unaffected. Whenever the circulation or the process of oxidation becomes insufficient the rate of removal of lactic acid will be less than the rate of its production so that the lactic acid concentration in the blood will rise and the alkali reserve of the tissues (including the blood plasma) will fall. Whenever the rate of production of lactic acid exceeds the rate of its removal by even the normal mechanism, lactic acid acidosis may result. In cases of cardiac decompensation or in postoperative shock with lowering of the blood pressure oxygenation in the tissues is interfered with and lactic acid

accumulates; with improvement in the circulation the lactic acid promptly disappears from the blood.

In general anesthesia and certainly with ether, many of the aforementioned conditions obtain. There is the muscular activity, gagging, coughing and straining incident to "going under," there is the possible interference with circulatory balance, and of cyanosis with deficient oxidation—a combination of conditions which increases the production and interferes with the excretion or removal of lactic acid.

And lastly, we come to a discussion of operative and postoperative care for the prevention of acidosis in children. It is patent that surgeons should be more familiar with this preventive technique than pediatricians who at best can act only in an advisory capacity. It must be patent, too, that pediatricians can hardly be expected to be so familiar with the needs of this situation as their surgical confrères. For that reason and because of a necessarily limited experience I must content myself with the statements of those who can speak authoritatively on the subject and, after analyzing their findings, draw conclusions that serve the best ends for children. Howland and Marriott say:

> Following surgical operations, especially in children, a marked overproduction of the acetone bodies may occur and this not infrequently leads to a condition of acidosis. It is not yet entirely clear how this acidosis is brought about. The acidosis which occurs is not entirely due to the acetone bodies as the amount of these is not always sufficient to account for the degree of acidosis observed."

Secor says:

> The two distinct causes of acidosis—starvation and anesthesia—when occurring at the same time in the same patient may produce such a degree of toxicity as to become alarming or even fatal.

Crile finds that the hydrogen-ion concentration of the blood is increased after the inhalation of anesthetics. Ether, nitrous oxide and alcohol produce an increase in "acidity" of the blood *apparently proportional to the depth of anesthesia.* This acidity may in itself be the cause of death. Inhalation anesthesia increases any preexisting tendency to acidosis which results from starvation, from great exhaustion, from surgical shock and from hemorrhage.

Jeans and Tallerman, in studying the causes of postoperative acidosis, conclude that "some as yet unidentified factor is largely responsible for the lowered alkali reserve which is observed in this type of case."

Fischer says:

> Commonly the urine shows even before operation a high hydrogen-ion and that such patients make poor surgical risks and should be given the benefit of preliminary treatment.

What effect has ether *per se,* in amount and in method of administration, upon the production of postoperative acidosis? Is hepatic function temporarily deranged by the anesthetic itself or its by-effects—much as it is in the toxemia of infections and infectious diseases—and does ketosis result from a defective glycogen reserve or improper utilization or combustion of carbohydrates? Does the ether produce a temporary congestion of the kidneys and thus interfere with acid elimination? Does the general anesthesia, as aforementioned, by increasing muscular activity, diminishing oxygenation or interfering with circulation and respiration, increase the production and interfere with the excretion of lactic acid?

Has ether any effect upon the metabolism and the oxidation of foodstuffs as they are carried to the liver by the portal circulation there to store up glycogen?

What effect has chilling of the body surface and perhaps of the liver upon the stabilization of glycogen?

What rôle do shock and the lowering of blood pressure, by diminishing oxidation, play in the production of acidosis?

Is there danger in the use of insulin in postanesthesia acidosis when we know

that in acidosis produced by fasting hypoglycemia is found? Or is insulin indicated in addition to glucose on the grounds that in postanesthesia acidosis there is a disturbance in carbohydrate metabolism and a small amount of insulin will tend to stabilize this and stimulate the glycogen reserve? Clausen states "In ketosis we have seen very rapid improvement follow the intravenous injection of glucose and insulin."

These and similar questions confronted me in an effort to submit preventive measures, and I have found many of the answers in the recent text-book on "Surgery of Childhood" by John Fraser of Edinburgh who, under the headings of general anesthesia and shock makes these pointed remarks:

The child is a more delicate organism than the adult, the active growth of the child's tissues rendering them peculiarly susceptible to the intoxication of anesthetics and it is in connection with this distinction that most of the difficulties and the dangers of the procedure depend . . . Allusion has been made elsewhere to the folly of purgatives and starvation as a preliminary to surgical operation, their use being objectionable in preparation for anesthesia because they render the body more susceptible to the toxic influences of the anesthetic . . . In starvation calls are made upon the various body reserves, upon the glycogen content of the liver and upon the alkalies of the blood, and in the face of this depletion the toxic influences of the anesthetic are particularly harmful . . . Nutriment is given to within two or three hours of the anesthesia and it should be of such a nature that it leaves little or no residue in the stomach. Water is given freely until within two hours of the operation unless the anesthetic is administered for an emergency in which its use cannot be avoided. The child must be in good general health: any evidence of fever, of bronchitis, even an ordinary cold should be accepted as an indication for postponement. Examination of the urine is a most essential precaution . . . but special attention is given to the detection of acetone . . . for it is a danger signal of great significance and should preclude the administration of an anesthetic until measures have been taken to correct the error which has resulted in its appearance.

The practical importance of these various facts from the anesthetic point of view is that the administration of a general anesthetic (especially chloroform and to a less extent ether) has a tendency to further increase the development of acetonemia, probably owing to a selective toxic action of the anesthetic upon the liver cells, whereby the glycogen content is so affected that it cannot be sufficiently employed by the body. As a precautionary measure, therefore, the preoperative administration of alkalies is to be recommended. The clinical manifestation of acetonemia may be so slight as to be almost undetectable, hence the importance of the routine urine examination by which its presence is demonstrated.

Ether has the important drawback that ether vapor reduces the temperature in its immediate vicinity by between 25° and 30° F. Most of the disadvantages are overcome, or at least minimized, if the vapor is warmed. We consider this to be one of the most important details in the technique of ether administration to children. The commencement of the anesthesia will be by the ordinary open method as employed in adults, but when the stage of unconsciousness has been reached we recommend and use one of the various forms of apparatus which supply the vapour in a warm condition.

There are four conditions which so affect the individual that if the exciting factor of shock arises, either subsequent to or coincident with their existence, shock is more likely to ensue, and having been originated is probably of a severe type. These conditions are hemorrhage, cold, starvation and sepsis, and to these may be added—fear and pain. The first four are of extreme importance in the etiology of shock where children are concerned. Before shock has been long established, however, other influences appear. The inevitable result of a long-continued low blood pressure is that tissue metabolism is deranged—oxygen so essential for the vital functions of the body is insufficiently supplied to the tissues, the various anabolic and katabolic processes are interfered with, katabolism especially being affected, with the result that the system becomes loaded with imperfectly oxidized products of an acid character. Nature's provision against such a state of affairs consists in the accumulation of what are known as buffer salts—alkaline products which are stored in the blood plasma and the tissues generally. To neutralize the derangement of shock the buffer salts are called upon,

but their influence is soon exhausted, and as their totality diminishes the "hydrogen ion content" of the body increases and the condition clinically known as acidosis results . . . *The manifestations of established shock are therefore those of an acidosis* . . . The problem throughout, however, is obscure and it is difficult to give a concise and correlated account because certain of the links are absent. There is nevertheless in the following sequence, at least a measure of truth—the exciting factor of shock (operation or injury), a resulting low blood pressure, interference with tissue metabolism, acidosis, or a condition akin to it, progressing to a fatal issue if the sequence is not interrupted.

Enough has been said to indicate that while the causation and mechanism of acidosis in children as a result of food imbalance or disease are fairly well understood, they are not so clearly defined in relation to postoperative or postanesthesia acidosis. There are, however, sufficient leads to formulate measures for minimizing the onset of postanesthesia acidosis by preoperative, operative and postoperative care; and it is to this task that I apply myself in conclusion. The question of preoperative care is relatively easy to answer and the measures are readily carried out. The operative and postoperative care in relation to the prevention of ketosis offers much food for thought and speculation.

In the following I have assembled and formulated a routine of pre- and postoperative precautions against acidosis, a synopsis as it were, so that "those who run may read," and so that a scheme may be at hand at all times for all of us.

PEDIATRIC SUGGESTIONS FOR THE PREVENTION OF ACIDOSIS IN NON-ACUTE SURGICAL CONDITIONS REQUIRING GENERAL ANESTHESIA

Basis of Suggestions. (1) "If the liver can be made to harbor any carbohydrate it is a protective phenomenon (witness the giving of carbohydrates freely to children prior to tonsillectomies and the resulting avoidance of acidosis.") (Joslin.)

(2) "There are cases of coma (diabetic) resulting from operations with ether as an anesthetic. If you do wish to use ether it is a good plan to be as rapid and as skilled as the Mayos and to use as little ether as their anesthetists. Gas and oxygen and spinal anesthesia have been shown to be so superior to ether that in the larger hospitals in Boston it is not the custom to employ it in operations upon diabetics." (Joslin.)

(3) "The formation of glycogen (animal starch) from dextrose and the storage of glycogen in the liver and muscles." (Joslin.)

(4) The old saying, "Fats burn in the fire of the carbohydrates." (Rosenfeld.)

PREOPERATIVE CARE

Complete Physical Examination. Routine urine examination especially for acetone.

Rest and Quiet. Patient should be kept quiet and at rest in bed for 24–48 hours before operation. No visitors should be allowed.

Mouth and Teeth. Mouth, throat and teeth should be kept cleansed.

Water. At least three or four glassfuls of cool—not cold—tap water should be taken daily. More may be given if desired.

Diet. During the 24–48 hours preceding the operation the diet should be carefully regulated as follows:

Not Allowed

Meats, fish, eggs, oils, cream or fatty foods.

Allowed in Liberal Quantities Depending upon Age and Digestive Capacity

Skimmed milk, cocoa, cereals, vegetables (except asparagus, onions or other aromatic vegetables), baked or boiled potato, bread, crackers, fruit juices (orange, pineapple, grape juice, prune juice), a little butter, sugar, corn syrup, honey, jam, banana (ripe) and plenty of water.

Medications. During the 24–48 hours preceding the operation bicarbonate of soda should be given as follows: 1 flat teaspoonful dissolved in a tumblerful of cool

tap water; entire glassful to be taken in sips during 24-hour period.

Enemata. In the late afternoon preceding day of operation give soapsuds enema (castile or ivory soap) of one quart of warm water.

Before retiring give child enema of one flat tablespoonful of bicarbonate of soda in one quart of warm water, the last eight ounces to be retained; or eight ounces of a 10 percent glucose solution.

Morning of Operation. If operation at 8–9 A.M.: No breakfast. Mouth and teeth cleansed. At 6:30 juice of one orange diluted with half to one glass of cool water.

If operation in late morning or in afternoon: Light breakfast of cereal, bread, orange juice, skimmed milk (6 ounces) and a glass or two of cool water.

Prior to Operation. Child to be kept quiet and warm (well covered). All unnecessary talk to be avoided in presence of patient. Child to be reassured by anesthetist.

Anesthetic. Ether more conducive to production of acidosis than gas and oxygen or ethyl chloride.

The less ether given the better.

The more air given the better.

POSTOPERATIVE CARE

Keep patient well covered and *warm* during transfer from operating room to bed.

Keep patient warm when placed in bed.

Subject to orders of attending surgeon, fluids should be given as early and as abundantly as possible under existing conditions—by mouth, by rectum or subcutaneously—in the form of tap water or saline, bicarbonate of soda (5 percent), or glucose (5–10 percent) solution.

IF PREOPERATIVE CARE FAILS TO PREVENT ACIDOSIS

Symptoms Indicative of Impending or Existing Acidosis.

Drowsiness
Irritability
Mental sluggishness
Hyperpnea
Headache
Nausea and vomiting
Abdominal pain
Dessication or dehydration
Diminished urinary output
Cherry red or cyanotic lips (occasionally)
Unconsciousness
Coma

TREATMENT

Equipment. A full equipment to combat acidosis, however mild, whensoever occurring, or whatsoever the etiology *should be on hand at all times.* This includes stomach tubes, rectal tubes, hot water bags, tourniquet, hypodermatoclysis outfit with Y-glass tubing, needles for hypodermatic, subcutaneous and intravenous injections, insulin syringes, glass containers, funnels, sterile saline solution, 5 and 10 percent solution of sterile glucose or ampules of 50 percent solution of glucose (Swan-Myers), sterile bicarbonate of soda solution 5 percent, adrenalin (1–1000), digifoline, coramine and insulin.

Aims of Treatment. (1) To prevent further formation of acetone bodies.

(2) To neutralize acetone bodies.

(3) To secure excretion of acetone bodies.

Cardinal Points in Treatment. (1) Force fluids to eliminate and excrete acetone bodies and toxins.

(2) Administer insulin (more particularly in diabetic acidosis) to oxidize glucose and carbohydrates; to increase carbohydrate tolerance; to store up glycogen; to prevent formation of acetone.

(3) Give bicarbonate of soda to neutralize abnormally formed acids.

General Care. Keep patient quiet, covered and warm. Heat to extremities. If abdominal pain use hot water bag. Give colonic irrigation of soapsuds and hot water. If patient vomits persistently give gastric lavage with five percent bicarbonate of soda solution.

Force Fluids. All fluids should be *warm* and *given slowly*. Administration per os, per rectum, subcutaneously or intravenously.

Fluids Used. Water, orange juice with dextrose, physiological saline solution, bicarbonate of soda 5 percent, glucose 5–10 percent with or without salt, corn syrup (per os or rectum).

Guide for Amount of Fluids. Approximately ten percent of body weight in 24 hours. (Presbyterian Hospital.)

Glucose: 20 cc. of a 10 percent solution per kilo of body weight (Schloss).

Fluids

Per Os. If patient is able to swallow give 2 to 3 ounces of orange juice with 5–10 gms. of glucose every hour for 2 or 3 doses, or warm water 1 or 2 ounces every ½ to 1 hour, or bicarbonate of soda 1 teaspoonful in glass of tap water sipped every 15 minutes to half hour, or corn syrup, tablespoonful or two to ½ to 1 glass of water sipped every 15 minutes to half hour. (Four tablespoonfuls of syrup to pint of water equals approximately 5 percent glucose solution.)

Per Rectum. Gravity method. Give slowly. Use small tube and funnel. Strap buttocks if necessary. Give 150–250 cc. of 5–10 percent solution of glucose (15–25 gms. of glucose in 150–250 cc. of warm saline solution) two or three times daily, or give 5 gms. of bicarbonate of soda in 150 cc. of warm water two or three times daily. (When urine becomes neutral to litmus stop bicarbonate.)

Subcutaneously. 15–25 gms. of glucose in 150–250 cc. of warm saline solution every 4 hours (approximately ten percent solution) or 250 cc. of physiological saline solution.

Intravenously. Ten percent solution of glucose—25 gms. of glucose in 250 cc. of saline solution two or three times daily.

Insulin. In severe cases of postoperative acidosis 10 or more units of insulin may be added to the intravenous solution. (Watch blood sugar.)

Drugs. Strong coffee per rectum.

Digitalis preparations hypodermatically.

Adrenalin (1–1000) 5–15 minims hypodermatically.

Coramine .5–1 cc. hypodermatically.

Foods. To be started after fluids are retained and consciousness is complete. Begin cautiously and in small amounts. Orange juice, sugar (dextrose), cereals, milk and sugar, toast, crackers, corn syrup, cooked vegetables. Return to fats should be very slow.

Special Nurse. Moderate or severe acidosis calls for prompt, careful, persistent and energetic action. The proper kind of assistance includes the undivided attention of a trained nurse.

THE USE OF SUBSTITUTE OR EMERGENCY MUSCLES FOR TRANSPLANTATION IN THE FOOT

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IN the movements of the foot—dorsal flexion, plantar flexion, supination and pronation—there are certain muscles that work as prime movers under all conditions of loading, and other muscles that work only when these prime movers are taxed beyond their strength or are paralysed. These latter I choose to call emergency muscles.

To illustrate: in the movement of dorsal flexion the prime movers are the tibialis anterior and the peroneus tertius. The latter muscle is so small that it is always necessary for the peroneus brevis, although it has no dorsal flexor action, to contract also, if the anterior tibial is to be prevented from turning the foot in. A very slight amount of resistance will bring into action the extensor digitorum longus, which has pronator as well as dorsal flexor action; but it takes strong resistance to cause contraction of the extensor hallucis longus. If, however, the anterior tibial is weakened or paralysed the extensor hallucis longus will contract at the slightest attempt to perform dorsal flexion. Indeed, the cocking of the big toe, due to hypertrophy of this muscle, is an indication of anterior tibial weakness.

Now, in cases of anterior tibial paralysis the orthopedic surgeon commonly makes use of the peroneus longus, a musle opposed in both its actions to the actions of the anterior tibial. The anterior tibial performs dorsal flexion and supination when it contracts alone, and the peroneus longus, plantar flexion and pronation. Consequently the training of the transplanted peroneus longus to take up the new work of dorsal flexion and supination and to forego assisting the movements of plantar flexion and pronation, is something that requires time, patience, and skill. On the other hand, the extensor hallucis longus is ready and eager to take on the work of the anterior tibial and is therefore the natural substitute for that muscle. If it has normal power to begin with, it will, when detached from the great toe and fixed in the insertion of the anterior tibial, do very creditably as a dorsal flexor and supinator. It would be wrong to say that the peroneus longus should never replace the anterior tibial. The extensor hallucis longus itself may be weak, in which case the peroneus longus is without doubt the best muscle to take; or there may be a weakening of the posterior as well as of the anterior tibial, so that it is desirable to weaken pronation correspondingly by putting the peroneus longus on the inner side of the foot. In that case, however, the surgeon might prefer to perform a Hoke operation in order to get rid of lateral movements. Given, however, a foot normal in every way except for weakness of the anterior tibial, I believe that the extensor hallucis longus is the better muscle to substitute for the anterior tibial, in that it takes up its new functions naturally without any training, and that the extensor digitorum brevis is able to perform extension of the great toe sufficiently well without the help of the extensor hallucis longus.

In strong efforts to pronate the foot the extensor digitorum longus will be seen to contract, and this muscle is the natural substitute for what I should call the pronator dorsal flexors, the peroneus tertius and brevis. To be sure, its removal leaves the little toe without any extensor, since the little toe receives no branch from the extensor digitorum brevis, but if the lower end of the longus tendon is fastened into the bone to prevent dropping of the little toe, the loss of active extensor power will matter very little.

In supination of the foot strong resistance or loss of power in the tibialis posterior

will bring the flexor hallucis longus and flexor digitorum longus into contraction. These are the emergency muscles in supination of the foot and the natural substitute for the posterior tibial, but there are practical difficulties in the way of transplanting them. In the first place, the flexor hallucis longus is very powerful in maintaining the arch of the foot, as its tendon pulls taut, like a bowstring, whenever the toe is pressed against the ground. There is no doubt that its support of the arch would be missed if it were cut away from the big toe. The flexor digitorum longus would probably be less missed from its normal place, but it would not be an easy matter to give it the insertion of the posterior tibial. No operation of the sort has ever, to my knowledge, been tried.

In plantar flexion the peroneus longus and brevis and the posterior tibial contract without any help from the gastrocnemius and soleus unless there is fairly strong resistance. Very strong resistance or paralysis of the gastrocnemius and soleus will cause contraction of the flexor digitorum longus and flexor hallucis longus. Now the muscles commonly transplanted into the os calcis to take the place of the soleus and gastrocnemius are the peroneus longus and tibialis posterior. The peroneus longus works well in its new position, since it is a prime mover with the soleus and gastrocnemius and is needed in the combination to offset their supinator action; but the tibialis posterior in normal plantar flexion works alternately with the peroneus tertius as the center of gravity sways to the outside or inside of the foot, and in its new position refuses to work when direct plantar flexion is willed. It contracts strongly in the new position when supination is willed, but the peroneus longus then remains slack and it is a very difficult problem to make the two muscles cooperate for plantar flexion. It is my opinion that the flexor hallucis longus and flexor digitorum longus would do better service with the peroneus longus as substitute plantar flexors. Their support of the arch of the foot would not be missed, since gastrocnemius and soleus weakness is one of the chief causes of cavus. So far as I know, this operation has never been tried, but it seems to present no more practical difficulty than the transplantation of the tibialis posterior.

SACRAL ANESTHESIA IN THE TREATMENT OF STRICTURE OF THE URETHRA

A PRELIMINARY REPORT*

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NEW YORK CITY

THERE is an old urological maxim that local anesthesia should never be used in an attempt to dilate a stricture of the urethra. This has probably saved many a urethra from severe trauma at the hands of the inexperienced physician. To the one who understands the delicate structure of the urethra and treats it accordingly this old adage means nothing. During the past twenty-six years I have used local anesthesia quite liberally in stricture as well as in other urethral lesions.

In a very large series of local anesthesias used for operations on the lower urinary tract, the relaxation of the perineal stricture has been marked. This is particularly striking in that section around the bulbo-membranous junction, the most frequent location of urethral stricture. This is noted not only in adults; I have also seen it in about sixty cases where sacral anesthesia was used in children.

TECHNIC

The sacral injections are made in the usual manner. I prefer to prepare the skin with picric acid solution, for it does not obscure the vision quite so much as iodine. I use the Luer Lok type syringe and a small needle. These needles have the advantage that they can be bought in any drug or instrument store. The wheel is then incised over the sacral hiatus and the needle is withdrawn. The sacral canal is then entered with a three inch needle, injecting about thirty cc. of 1 per cent novocaine solution. I do not think it makes any real difference if one uses epinephrin also or not. Some seem to think this drug causes trouble. I have not seen it, even in a large series of cases. (My only difficulty in the use of epinephrin has occurred in circumcision. In these cases there was practically no oozing at the time of operation but bleeding occurred later.) It is wise to wait about fifteen minutes after the needle is withdrawn and then proceed to the urethra.

TYPES OF CASES

I have confined the use of this method to strictures of small calibre. By that I mean cases in which I had heretofore been unable to pass any instrument, or at best a filiform into the bladder. The procedure is then to introduce three or four whips of the Phillips or the Lefort sounds in the urethra down to the stricture. Very gentle attempts should then be made to pass the instrument. In every one of the cases (impassible previously) I was able to enter the bladder. The relaxation that takes place is sometimes so marked that often a much larger elastic catheter of the graduated type can be passed at the same sitting.

As this is only a preliminary report, I shall not discuss the anatomico-pathological conditions, but limit my further remarks to case reports.

CASE 1. J. W., white, age 48, single, native of Poland.

Former urological history: Apparently had an attack of gonococcal urethritis at 20 and another at 28. Believed himself cured of both attacks. No other genito-urinary involvement.

Present trouble: For the past four years he has had great difficulty in voiding urine, and has had three or four attacks of complete retention. In the first attack, about three years ago, a small metal cathether was passed, in the last two attacks only filiforms were passed. After the treatment by filiforms he was dilated up to about 20 F. He then felt so improved

*Read before the American Society of Regional Anesthesia, in New York City, October 5, 1926.

that he decided not to bother any more with dilatations.

He now appears with bladder considerably distended and has not voided for over twenty-four hours. Gentle attempts to pass any instruments result in failure. He was then given an injection of twenty cc. of novocaine into the sacral hiatus. Following the relaxation a number three Lefort sound was passed. This drained off the urine very gently, and was left in place for forty-eight hours. A number six catheter was then passed and improvement continued.

Case II. G. W., negro, married, age 52. Native of Jamaica.

Previous urological and venereal history: Has had several attacks of gonorrhea and thinks the first was about 28 years ago. Has had no infection as far as he knows in the last ten years. Denies lues. While employed on the Panama Canal about 1908 an abscess in the perineum was opened and an external urethrotomy was done at the same time. He was advised to have a sound passed about every four months and followed this instruction for about two years. Then his troubles began and about a year later he had to be catheterized. Several years later there was a recurrence and only a filiform could be passed. He became alarmed and continued the dilations until 1924. He had a large sound passed about twice a year. This procedure was usually difficult. At the time we saw him nothing would enter the bladder. Under sacral anesthesia he relaxed sufficiently to take a number five ureteral catheter. This was left in place for 48 hours and he then responded readily to further treatment.

Case III. K. P., white, age 27, native of U. S.

Previous urological history: Gonorrhea at 15 years of age, followed by a right epididymitis. At this time patient had pain in the right lower abdominal quadrant and was relieved of his appendix. It is quite likely that an inflamed spermatic cord and not the appendix was offending.

Present trouble: For the last two years he has noticed a considerable difficulty in voiding. There is an urgent desire and on attempting to urinate patient passes a very thin, slow stream. Since 10 A.M. of the previous day he has been unable to void at all. Gentle attempts to catheterize are ineffectual. A sacral injection was then given into the hiatus of 30 cc. of 1 per cent novocaine.

After the usual rest, three Lefort whips passed the stricture and were allowed to remain 48 hours. Following this the patient was brought up to a number 30 sound. Two sounds were usually passed, that is, if a 22 and 23 were passed last week, today we will use 23 and 24. This method, which we have used for many years, seems quite effectual.

Case IV. J. McH., 65, white, married, native of Ireland.

Father died of a bladder tumor at 62.

Previous urological and venereal history: Patient at first denied any urological infection. Later he admitted that he had a troublesome urethral discharge when he was about 30 years of age.

Present illness: Patient believes that he has inherited his condition from his father, in other words, that he too was suffering from a vesical neoplasm.

Present condition began about a year ago when he noticed difficulty in passing his urine, with a considerable increase in the urgency and frequency. He was examined by a number of physicians who told him that his trouble was a common one in men of his years, viz., prostatic hypertrophy.

In the last few days trouble has been greatly exaggerted and he is unable to pass any urine. There is no record of urination for about twenty-four hours. The prostate is but slightly enlarged posteriorly. The suprapubic area is distended visibly by bladder.

On attempting urethral instrumentation a distinct obstruction is noted, not in the prostatic area, but at the bulbo-membranous junction—a distinct stricture and not a prostatic hypertrophy. [It is well to bear in mind, however, that elderly patients with acute and chronic retention of urine may have not only an hypertrophic condition of the prostate or a stricture, but both.]

I succeeded in passing a filiform on this patient, but as the stream was extremely small, I decided to go further. A sacral anesthesia was administered and in about 20 minutes I passed a No. 4 ureteral catheter. The further progress of the case was uneventful.

Case V. J. E. H., white, age 47. Native of Finland.

Previous urological and venereal history: Patient believes he had "strain" when he was about 17 years of age, but denies any venereal infection.

Present trouble: For three or four years increasing difficulty in voiding urine. Although a number of physicians informed him that he had a stricture he has never permitted the passage of a sound. He has a frequent desire to urinate during the day, but passes very little. He is now in great pain and has not voided in the past eighteen hours.

Examination shows a stricture of the urethra at the bulbo-membranous junction. In spite of hot baths and local applications to the urethra it cannot be passed. Sacral injection of 30 cc. of a 1 per cent novocaine, was given and in fifteen minutes there was a considerable relaxation of the perineal body and two filiforms were slipped through the obstruction. The after-treatment of the case was uneventful. A number 20 Charrière was reached, the patient disappeared.

I have found the study of these cases of very great interest, as we believe it opens up an entirely new field. A thorough investigation of the literature has revealed no research work on the lines laid down in this paper. Stricture of the urethra is by no means nearly so common as formerly. This is not by any means intended to intimate that there is less gonorrhea than formerly. On the contrary, I believe that of our paternalistic laws, the gonococcus is more widely distributed. The educational programme which has been carried out, however, has been of value, in that we see our cases much earlier and we have therefore fewer strictures to treat. The urologist undoubtedly sees more strictures than the general surgeon and *when we do see them*, these are just as bad as of yore. I hope the method here suggested will be found of aid in robbing urethral stricture of some of its terror.

HERNIA OPERATIONS IN THE AGED

LEIGH F. WATSON, M.D.

CHICAGO

THERE is a general sentiment that elderly people should not be subjected to surgical operations except as a last resort. For many years I have opposed this opinion, especially insofar as concerns operation for non-strangulated inguinal and femoral hernia under local anesthesia. Of course, there are patients for whom operation is contraindicated, but I believe they are rare.

When a patient wants to be operated on I see no reason for discouraging him and assuming a pessimistic prognosis simply because he is old. The patient himself is the best judge as to when his hernia becomes unendurable. By the time he has reached his age he has his own philosophy, realizes his life expectancy, and knows whether or not he wants to live it out under existing conditions.

Elderly people suffer more pain and discomfort from their hernias than younger people do, and the result is that most of them are semi-invalids. On account of their reduced vitality they complain most bitterly against the annoyance and irritation produced by the hernia and truss. Their working capacity is reduced 25 to 75 per cent; they cannot get sufficient exercise to keep well; and their strength is continually sapped by unexpected attacks of colicky pains and partial obstruction in the hernia. I have operated on a number of patients who were between 60 and 85 years old, always using local anesthesia, and their gratitude for being freed of the hernia is pathetic. I am sure in every instance the patient's life has been prolonged, and there has been no mortality in non-strangulated hernia.

Truss Wearing. Every elderly patient who wears a truss and believes it is properly fitted knows that it is only a makeshift, that it will not cure his hernia, and that there is danger of strangulation at any time should the truss slip. He lives in daily fear of an emergency operation, and still it is not unusual to see these unfortunate victims finally come to operation after they have worn their truss from 40 to 60 years.

Strangulation. Too often hernia is disregarded until strangulation occurs, and thus the most favorable time for operation has slipped by. Strangulation is always particularly serious in the elderly. The vomiting and inability to take food rapidly weaken the patient; the absorption of toxins clouds the mind, producing apathy and stupor; the heart action becomes rapid and feeble; the temperature rises as the vitality ebbs; and the prone position favors the development of pneumonia—a frequent cause of death in the aged.

I have found that for all hernia operations in the aged, the best results follow close attention to the preoperative treatment, the anesthetic, the type of operation, and the postoperative treatment.

Preoperative Treatment. The patient should never be weakened by drastic cathartics. Severe purging and repeated enemas diminish the tone of the intestines and predispose to gas pains and postoperative intestinal paresis. A mild laxative the day before and a low enema on the morning of the operation are sufficient.

The patient should not be kept in bed previous to operation; he should take his usual walk and exercise the day before. Every day spent in bed lessens the aged person's chance for recovery. A careful urinalysis and blood examination should always be made. If the patient has diabetes, insulin should be given and a proper diet prescribed. Nephritis, cystitis and bronchitis must also receive appropriate treatment.

The patient should be well wrapped and protected from undue exposure while

being taken to the operating room. An important point is to see that the operating table is heavily padded with quilts or blankets to make it soft and comfortable. This provision is to conserve the patient's strength because he cannot stand discomfort and tires easily. The body and extremities must be kept warm by hot water bottles or an electric pad, and the operating room must be kept warmer than for younger people. If the patient is in shock or if the blood pressure is low, bandaging of the limbs is helpful; this autotransfusion forces more blood to the brain centers where it is most needed.

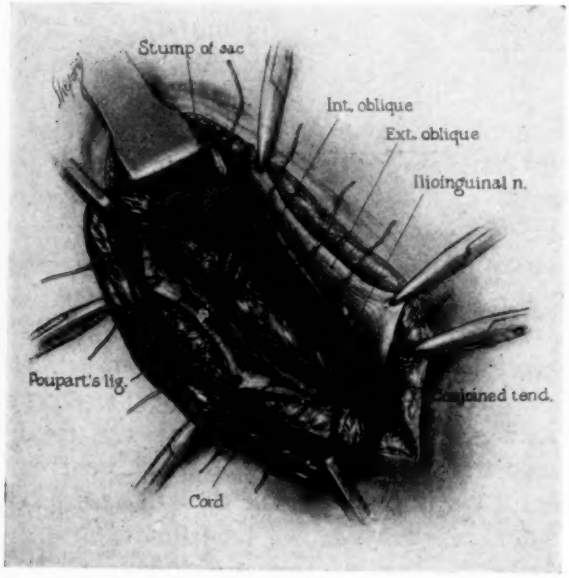

Fig. 1. Inguinal hernia operation in the aged. The deep sutures in the modified Bassini operation. Note that the lower suture does not make pressure on the ilio-inguinal nerve. The upper suture is high up behind the cord and tightly closes the internal ring.

The Anesthetic. It should be remembered that the aged patient's margin of safety is limited, and it must not be jeopardized. No matter how good his general health may be, if he is given general anesthesia—whether ether, chloroform, nitrous oxide, ethyl chloride or ethylene, for the systemic effect is the same with all—there will be a depression of the already exhausted vital centers and body functions. The shock is felt by the brain, heart, lungs and kidneys, and if there should be post-operative vomiting the outlook is exceedingly grave. All of these dangers are avoided if local anesthesia is used. In adults I use general anesthesia in less than one per cent of my operations for hernia.

Every step that is carried out under general narcosis can be done with local anesthesia. There is no pain or shock, the patient is not unconscious, the heart action and blood pressure remain unchanged, the kidney function is not disturbed, the lungs are not burdened by a noxious chemical irritant, and the absence of vomiting permits the taking of liquid food immediately—a very important point for frail patients. Local anesthesia will do more than anything else to reduce the mortality in the aged where shock and lowered vitality too often exact their toll.

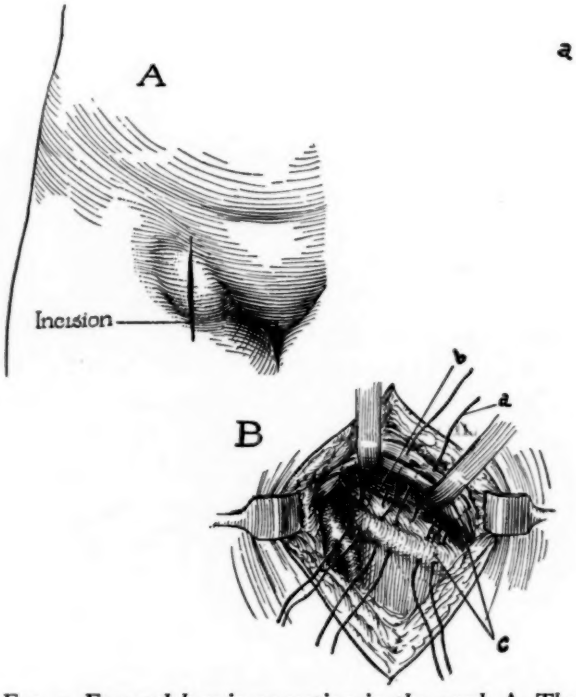

Fig. 2. Femoral hernia operation in the aged. A. The incision. B. Closure of the femoral ring. *a*, Deep U mattress suture. *b*, The closed femoral ring. *c*, The sutures that approximate the lower edge of Poupart's ligament to the pectineus muscle and fascia.

The successful local anesthesia hernia operation is painless. Patients frequently

fall asleep during the latter part of a single or double operation, especially when the sac is extensively adherent and the gentle dissection is necessarily slow. Good results in the elderly depend upon patience, and intimate knowledge of sensory nerve distribution, and judgment in anticipating their individual needs. I usually employ novocain in 0.5 per cent solution with 2 minims of epinephrin solution, 1:1,000 to each ounce of the novocain solution, to prolong the anesthesia. The technic of the injection I have discussed at length elsewhere.[1]

The Operation. For aged patients the simplest operations are the best. For inguinal hernia in men I use the Bassini operation with transplantation of the cord, or some modification of it. For femoral hernia I use the femoral operation. After ligating and excising the sac, the femoral opening is closed with a purse-string suture. If the ring is large a mattress suture is passed from a point one inch above the lower edge of Poupart's ligament through the aponeurosis of the external oblique, the internal oblique and transversalis muscles, then a good bite is taken in Cooper's ligament including the periosteum. The suture is passed back through the transversalis, internal oblique, and aponeurosis of the external oblique and tied. This draws the abdominal wall down to the femoral ring without stretching or weakening the inguinal canal. If there is strangulation, an extensive operation should not be done. Two operations are better than a dead patient.

Postoperative Treatment. The after-treatment of the aged patient is very important. He requires more watching and care than the younger patient. No matter how good the condition the physician must never relax his vigilance. Special nursing is almost a necessity and, if possible, the patient should be under the care of a nurse who has had experience in similar cases.

Immediately after operation the patient should be placed in the jack-knife position, by elevating the shoulders on two pillows or on a low back rest, and by resting the knee of the affected side, or both knees, on a pair of pillows. In this position the muscles and aponeuroses are relaxed, and there is less strain on the deep sutures than when the thigh is straight. A pillow or two at the foot of the bed for the patient to push against keeps him from slipping down, and prevents the bed clothes from resting on his feet.

The after-pain should be controlled with small doses of codein or mild sedatives. Morphine is usually to be avoided. An elderly patient should be catheterized by the clock, instead of waiting for him to complain; I have seen the distended bladder rise nearly half way to the umbilicus before producing marked discomfort.

The patient should be turned in bed often, beginning a few hours after operation. The administration of fluids should be forced and nourishment resumed without delay, with soft diet on the second or third day. The aged patient does not stand confinement to bed; he should have a back rest on the third day, and the following day he should be gotten into a chair. These elderly people will die if they are kept long in bed.

In conclusion, I believe that there is no field in surgery where painstaking efforts produce more gratifying results than in surgery for the aged. It deserves more attention.

Success depends on the same skill and judgment that apply to all operations, plus careful attention to many details that are not so necessary in more youthful and vigorous subjects. The experienced surgeon will adapt the operation to the patient and not endeavor to make the patient conform to a standardized operation and routine.

[1] Hernia. C. V. Mosby Co., St. Louis, 1924.

A COMBINATION OF METHODS IN THE MANAGEMENT OF PERITONITIS

WITH CLAIM OF SUPERIORITY*

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IN spite of the great progress of modern surgery it is still more the rule than the exception that the average surgeon views with despair the cases of rapidly spreading peritonitis coming under his care.

It is more than twenty years since the Murphy drip and Fowler position were introduced. They were master strokes by master hands that made a sharp cut in the mortality figures of this dread complication, and, in my opinion only one really major advance in the technique of the management of general peritonitis has been published since that time, viz., enterostomy. Many surgeons are now convinced of the value of this procedure.

There is no specific, nor will there ever be. Peritonitis is a condition that may vary from occult inflammatory changes about a diseased appendix or infected fallopian tube to fulminating suppuration spreading throughout the abdomen.

Why should general peritonitis have such a terrible mortality rate? What is the real cause of death? Is it the absorption of the pus by the peritoneum? Is it the carrying of the toxins from the general peritoneal cavity into the blood stream or lymph channels? Both opinions have been advanced; and we have been taught that pus bathing the upper abdomen is more rapidly absorbed and the peritonitis in that case more surely fatal. The opinion held by many today and that which seems far more probably correct is that death is caused by absorption of toxins from the lumen of the intestine.

There doubtless is some absorption of toxins from the general peritoneal cavity but this plays only a minor part in the cause of death. Pus and infective material in the general peritoneal cavity produce their greatest harm by favoring inflammatory changes in the gut wall which destroy tone, produce stasis and permit distension. Budde has shown that anaerobic bacteria are particularly responsible for the paralyzing effect.

As soon as a single loop of intestine becomes inflamed and the wall thickened rhythmic peristalsis is interfered with, stasis occurs and gaseous products of fermentation of the intestinal contents become manifest. This production of gas within the lumen of the gut causes an increased pressure in the intestine which, in turn, favors absorption from the intestinal lumen.

The very important part played by intestinal distension in the whole picture of spreading peritonitis has not until recently been given the attention due it.

Recently Stone and Firor, of Baltimore, at the 37th annual meeting of the Southern Surgical Association, expressed views that comprehend distension as an important element in the absorption of toxins, and not because it leads to vascular disturbances and subsequent necrosis, but because it is a form of increased intraintestinal pressure. Even without gross distension, great pressure may exist within obstructed loops. This would explain the instances of dogs dying of obstruction in which loops are found that are neither distended nor necrotic. These cases are the exception, however. Distension, according to these investigators, is no doubt a most important factor in producing pressure. The mucosa may be thought of as a membrane permeable under the conditions of normal digestion to water, salt, certain carbohydrates and the split products of the digestion of fats and proteins; but, the membrane is not working under normal

* From the Kerrville Clinic and Secor Hospital.

conditions when obstruction occurs. The toxic substances accumulate in much greater concentration under much greater pressure and for much longer periods of time than occurs normally. It is sound theory that a membrane may become permeable under such conditions to the passage of substances which, lacking such pressure concentration and time conditions, would not pass through it. This idea would exclude the necessity for assuming any circulatory disturbance or tissue necrosis as at all essential to absorption, though such incidents may occur and may perhaps increase the rate of absorption.

Our clinical study of postoperative ileus, intestinal obstruction and peritonitis has led us to agree with the opinion expressed by Stone and Firor and we believe that their work gives a scientific basis and plausible explanation of the excellent end-results that we have been able to obtain in these cases.

In 1915 we were studying the effect of hypodermatic injections of pituitary extract on intestinal stasis, especially postoperative ileus. We found that distension could be prevented by repeated injections of pituitary extract; that a moderate degree of distension could be relieved by full doses of pituitary extract; but that when the gut became widely distended even massive doses of pituitary extract produced no apparent effect.

While making these studies we noted that in a case of beginning peritonitis or even in one in which peritonitis had progressed to a marked degree if we could prevent the intestinal distension we prevented in large measure the absorption of toxins.

This observation led us to follow out a definite routine management in all laparotomies with drainage. In appendiceal abscess, ruptured pus tubes, etc., the standard technique is used in removal of the focus and placing of multiple rubber tissue drains. After operation the patient is placed in the Fowler position and a Murphy drip is started immediately. To each pint of water is added 45 grains of hexamethylenamine, and one dram of sodium chloride. Two pints of this mixture are given very slowly during the first twelve hours—then one pint at six-hour intervals for the next twenty-four hours.

It is essential to start the drip as soon as the patient is returned to bed—the rush of fluid toward the drainage opening carries with it pus, débris, and infective agents, relieving the peritoneum of a great burden.

If the drip is not started at once various segments of the intestine will become cemented together, the drainage area will soon be walled off, and very little drainage from the general peritoneal cavity can take place.

If the abdomen drains freely the first thirty-six hours, we feel very optimistic; but the failure of serous fluid to soak the wound dressings at least twice during the first twelve hours we regard as serious.

Five minims of surgical strength pituitary extract given on the table, followed by ten minims when the patient reacts from the anesthetic, will do much to prevent intestinal distension. Then whenever distension becomes evident pituitary extract should be given in repeated doses of sufficient strength to keep the intestine from ballooning, to keep the gut wall in tone, to prevent stasis, stagnation, increased intraintestinal pressure, rapid absorption of toxins and death.

Pituitary extract used early, used repeatedly, used fearlessly may be a life-saver in peritonitis. The postoperative regimen outlined above will do much to aid in the prevention of the extension of the peritonitis but in spite of these preventive measures there will be some cases that will be so far advanced when first seen that these procedures will have little or no apparent effect in staying the rapid progress toward death.

Until recently these cases had the surgeon "whipped," his hands were tied, there was nothing else he could do. Today, however, a remarkably high percentage of

advanced cases of general peritonitis can be saved. Two of my recent cases were in extremis; a few years ago we would have regarded their recovery as absolutely impossible; they both made perfect recoveries and are well today.

The measure responsible for this brighter outlook is enterostomy. We place a small soft rubber tube into a distended loop of small intestine, preferably jejunum, permit any liquid contents to escape, then inject through the tube four ounces of a saturated solution of magnesium sulphate, clamp the tube for an hour and then release the clamp and permit drainage. The magnesium sulphate injection is repeated once each twelve hours for four times. This favors removal of toxins, not only from the lumen of the gut but also from the intestinal walls even after absorption is advanced. The beneficial effect is soon manifest and a picture of death and despair is changed to one admitting reasonable helpfulness.

In some cases both cecostomy and high enterostomy should be done, especially if there is any sigmoid obstruction.

In a few cases we have used hypodermatic injections of ergot to prolong and fortify the pituitary effect on the intestines. It gives promise of value but until a larger number of cases have been observed we can give no definite opinion of its usefulness.

SUMMARY

1. The mortality rate of general peritonitis can be lowered.

2. Death from peritonitis is due to absorption of toxins from the small intestines.

3. Measures that will prevent stasis, intestinal distension, increased intra-intestinal pressure and absorption of toxins will lower the death rate from peritonitis.

4. Properly placed drainage and effective Murphy drip applied immediately after the patient is returned to bed will wash out the general peritoneal cavity and lighten the strain on his resistance.

5. Hypodermatic injections of pituitary extract begun on the table and repeated to effect, will prevent stasis, loss of intestinal muscle tone, distension and increased absorption of toxins.

6. Enterostomy properly placed and used to drain toxic material from the gut by the aid of magnesium sulphate lavage will produce surprisingly good results in those who fail to respond to other measures and are plainly in extremis.

CARCINOMA OF BOTH BREASTS IN A WOMAN UNDER TWENTY YEARS OF AGE

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(From the Surgical and Laboratory Services, Mt. Sinai Hospital)

CLEVELAND

CARCINOMA of the breast in patients under twenty, although infrequent, is probably less rare than is generally supposed. This assumption is supported by the statistics of the United States Bureau of the Census for the past twenty-five years of death in 85 females under twenty years of age from cancer and other malignant tumors of the breast.

In a careful search of the literature for cases of carcinoma in young individuals there were noted about twelve cases of unilateral cancer of the breast (confirmed by microscopic examination) in patients under twenty years of age, but only one case of cancer of both breasts in a girl under twenty years of age. The details of interest in this case, reported by R. H. Fowler, *Medical Record*, LXXXVII, 730, May 1, 1915, are as follows:

She was 20 years old, and was admitted to the Kings County Hospital, Service of Dr. J. Bion Bogart, September 17, 1914. She first noticed a growth in the right breast when 17½ years of age. She was married at 19 and immediately became pregnant. The growth was observed to increase rapidly in size at this time. At the Mount Sinai Hospital, New York, in February, 1914, pregnancy was terminated at the sixth month and a radical amputation of the right breast was performed by Dr. Berg. Upon microscopic examination the tumor was diagnosed scirrhus carcinoma. Following the operation she felt well until nine weeks prior to her admission to the Kings County Hospital. On admission, six months after the first operation, recurrences were noted in the main scar as well as in the multiple scars resulting from incisions for draining the axillary flap on the right side. There was invasion of the opposite breast and enlargement of the axillary lymph nodes upon that side as well as invasion of the left lung and the right humerus. These were regarded as metastases. The metastasis in the left breast was at the junction of the third rib with the sternum (upper inner quadrant). It was a hard, diffuse, infiltrating swelling, somewhat movable and of indefinite dimensions, not tender. The overlying skin was uninvolved. There was a scar in the situation which felt nodular. Palpation of the axilla on this side showed moderately enlarged nodes along the upper border of the pectoralis major. On October 29, 1914, a small papule was removed which on microscopic examination by Dr. Terry proved to be a scirrhus carcinoma. The patient died in less than nine months after the first operation, and in less than eighteen months since the tumor was first observed.

CASE OBSERVED AT MT. SINAI HOSPITAL, CLEVELAND

H. G., born December 28, 1905, was admitted January 4, 1922 (aged 16) to the Orthopedic Service for correction of deformities of the legs. She also complained of a swelling in the left breast. At times there had been a bloody discharge from the nipple and pains in this region. She showed the characteristic picture of congenital osteomalacia (osteogenesis imperfecta) with increased fronto-occipital and temporal diameters. There were deformities of both upper and lower extremities due to multiple fractures. In the left breast there was a tumor, about 7 cm. in diameter, immediately under the nipple and freely movable. The axillary lymph nodes on this side were not enlarged.

The pre-operative diagnosis was "polycystic disease of the left breast (non-malignant)." On January 7, 1922 the greater portion of the left breast, including the nipple, was removed.

Pathological Report (S.P. 6711). Specimen consists of breast tissue in which there is a tumor under the nipple approximately 7 cm. in diameter. On cutting through it, it is apparently a cyst in which a tumor mass occupies the greater portion. The tumor is friable and translucent in appearance. It is well encap-

sulated in this cyst. Microscopic sections show the tumor mass made up of papillary structures composed of fibrous tissue covered by cylindrical and in places cuboidal cells almost everywhere in a single layer. Diagnosis: cystadenoma of breast. Subsequent microscopic examination of the tumor shows in numerous areas in the body of the tumor, extension of epithelium into the regional stroma. In places at the periphery of the tumor, are observed extension of the epithelium into the capsule and in one place beginning extension of the

FIG. 1. Photograph of right breast (second operation). Papillary cystadenocarcinoma several cm. in diameter.

epithelium through the capsule into the regional breast.

The patient was readmitted June 24, 1923 (16½ months after her discharge from the hospital) with the complaint of a yellowish discharge from the right nipple. In the right breast were several irregular cyst-like masses in the vicinity of the nipple. They were freely movable and there was no involvement of the axillary nodes.

The pre-operative diagnosis was polycystic disease of the right breast (non-malignant). The patient was operated upon July 3, 1923 and the entire breast, including the nipple, was removed.

Pathological Report (S.P. 8346). Specimen consists of right breast. The nipple is retracted several millimeters below the general level. In one portion there is a mass of friable to firm, greyish-white tissue several centimeters in diameter, quite circumscribed, not definitely encapsulated. In places, especially in the neighborhood of the tumor, there are small cysts within the breast tissue some with fleshy-white masses within them. Microscopic examination of the sections of the breast show changes characteristic of chronic mastitis, papillomatous cysts and early papillary cystadenocarcinoma.

On July 16, 1923, the patient was again operated upon and a radical dissection was done with removal of pectorales major and minor muscles and axillary lymph nodes and fat on the right side. On microscopic examination no tumor tissue was observed in muscle, fascias, fat or lymph nodes.

FIG. 2. Photograph of left breast (fourth operation). Papillary cystadenocarcinoma, 1 cm. in diameter.

The patient was discharged August 29, 1923, to the *x*-ray department for *x*-ray treatment of the right breast.

The patient was readmitted April 16, 1925 (twenty months after her discharge from the hospital) with the complaint of swelling in the left breast. For two months she had noticed several small growths there which gradually increased in size. Examination showed three small tumors in the vicinity of the former scar. They were firm and not freely movable. There was some enlargement of the axillary lymph nodes.

The pre-operative diagnosis was malignancy of the left breast.

On April 17, 1925, one of the small tumors

was removed and a frozen section was made. Examination of this showed intracystic papillary epithelial masses with definite invasion of the walls and extension into the regional breast tissue for a small distance. A radical amputation was then done with removal of

FIG. 3. Photograph of axillary lymph node, left side (fourth operation). Papillary cystadenocarcinoma metastasis, 1 cm. in large diameter.

both pectorales muscles and a clean dissection of the left axilla.

Pathological Report (S.P. 10,298). Specimen consists of a mass of breast tissue 14 × 6 × 2½ cm. composed in great part of fat. In places, however, there are masses of fleshy-whitish, somewhat friable tissue, circumscribed within dilated ducts, the largest 1 cm. in diameter apparently firmly attached to the wall. Five such areas are revealed after repeated section. Another mass consists of muscle and axillary tissues including eight lymph nodes varying in size. The largest, 1.5 × 1.5 × 1 cm. shows within it and almost entirely replacing it a cyst-like structure almost entirely filled with fleshy-friable, whitish tissue. Microscopic examination of the paraffin sections of the tumors in the breast and in the axillary lymph node show changes characteristic of papillary cystadenocarcinoma with metastasis in axillary lymph node 1 cm. in diameter.

The patient was discharged May 15, 1925 to the *x*-ray department for *x*-ray treatment.

On reexamining her a year later (May, 1926), both scars were sound, and there was no evidence of any recurrences. She was able to abduct both arms fully.

COMMENT

The case reported above is the youngest of carcinoma of both breasts in the literature and the second recorded under twenty years of age. The first tumor was noted in

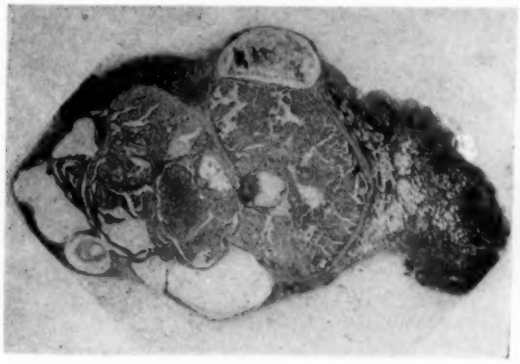

FIG. 4. Photomicrograph (10×) of axillary lymph node, left side (fourth operation). Papillary cystadenocarcinoma metastasis.

the left breast when the patient was 16 years old. This tumor, removed shortly thereafter, showed in places an invasive character. Seventeen months later a papil-

FIG. 5. Photomicrograph (about 125×) showing character of papillary cystadenocarcinoma in breasts and lymph node.

lary cystadenocarcinoma several centimeters in diameter was removed from the right breast. When the patient was 19 years, 4 months old, multiple smaller, similar,

malignant tumors, including a metastasis in an axillary lymph node, 1 cm. in diameter, were removed from the left side. The patient is alive, in good health, fourteen months after the last operation with no evidence of recurrences on either side.

In the first recorded case of cancer of both breasts in a patient under twenty years of age (Fowler's), the evidence favored a primary tumor in one breast with subsequent metastasis to the other. In the case observed at Mt. Sinai Hospital, Cleveland, the evidence favors the view of a primary origin of carcinoma on each side within papillomatous cysts following chronic mastitis.

The cases of carcinoma mentioned in this report show, despite the general opinion to the contrary, that carcinoma of the breast occurs in patients under twenty years of age, and that the possibility of its presence should be considered in tumors of the breast at any age.

(We are indebted to Professor H. T. Karsner for his interest in the case reported and for taking some of the photomicrographs. His diagnoses of the specimens corroborated those recorded.)

ACUTE MESENTERIC THROMBOSIS; RESECTION; RECOVERY: A CASE REPORT

FREDERICK C. WARNSHUIS, M.D., F.A.C.S.

GRAND RAPIDS, MICH.

C. E. Male, age 50, November 11, 1925.

Family and Previous Histories. Essentially negative.

Present Illness. Started about 9:00 P.M., November 10, 1925 with generalized abdominal pain. Vomited several times last night and this morning; unable to retain even water. Vomitus brownish in color. Pain chiefly in the midline about two inches below umbilicus and toward left lower quadrant. No history of previous attacks. Bowels have not moved since onset of illness. Took some salts about one hour after onset.

Pbysical Examination. Abdomen moderately rigid throughout. Marked tenderness below umbilicus and in left lower quadrant. Peristalsis can be seen and felt now and then. Otherwise negative. W. B. C., 27,800; 92% polys.

Tentative Diagnosis. Acute intestinal obstruction.

Operation. Mesenteric thrombosis of jejunum and ileum. Considerable free fluid in abdomen. About two feet of bowel involved.

Resection of bowel, inversion of ends with lateral anastomosis. Cigarette drain. Culture taken.

Two days postoperative: Moderate abdominal distention. Vomiting brownish fluid slight fecal odor. Gastric lavage about 1000 cc. fecal fluid obtained and considerable gas. Subcutaneous saline 1500 cc. and for time being nothing by mouth.

Treatment thereafter included repeated gastric lavage, intravenous glucose solution injections, pituitrin enemata, and carefully graduated feeding. The patient was discharged, well, on December 2nd

Laboratory Report. Smears and culture negative. Piece of intestine, 32 c.m. long, hemorrhagic, discolored, swollen and very friable. Removed with about 1 c.m. of mesentery. Lumen filled with blood.

Microscopic section of intestine shows the wall edematous and filled with extravasated blood and leucocytes. Mucosa greatly swollen, hemorrhagic. Epithelium destroyed. Tissues stain well. Some vessels are thrombosed, others clear. Sections through mesentary close to bowel wall show thrombosis of some of the vessels but most of them clear. Some of the veins show acute phlebitis.

Diagnosis. Acute phlebitis of mesenteric veins. Thrombosis. Hemorrhage in intestinal wall. No gangrene.

TRANSACTIONS OF THE SECTION OF SURGERY, NEW YORK ACADEMY OF MEDICINE

MEETING OF MAY 7, 1926

THE CHAIRMAN, DR. FREDERIC W. BANCROFT, PRESIDING

THE CLINICAL APPLICATION OF EXPERIMENTAL STUDIES IN INTESTINAL OBSTRUCTION*

HARVEY B. STONE, M.D.

BALTIMORE

(From the Department of Surgery, Johns Hopkins Medical School)

A REVIEW of the experimental work done in intestinal obstruction shows that the following ideas in regard to its mechanism are more or less generally accepted: First, that death is due to a form of intoxication; second, that the source of this intoxication is protein decomposition in the obstructed bowel (various writers have reported different toxic elements found in the bowel under obstruction conditions but all agree that the source of these toxins is protein degredation); third, that the absorption of toxins is fully as important a mechanism as their formation. From work done by my associates and myself, directed principally toward the understanding of the process of absorption, the important conclusions drawn may be summarized as follows: 1. An appreciable interval of time, experimentally determined as from ten to twenty hours, elapses before any considerable volume of fluid accumulates in obstructed bowel. 2. This fluid gradually becomes more toxic and after an interval of about thirty-six hours, in cases of high intestinal obstruction, the toxicity of the contents is very marked. 3. The mounting pressure within the bowel, which accompanies intestinal obstruction, is a very important factor in the absorption of toxins. It is probable that the bowel wall under conditions of pressure which obtain normally in the open gut, is not permeable to the toxic substances; but the increased pressure from an obstruction alters the permeability of the bowel wall so that these toxins may penetrate it. 4. The increased pressure within the bowel which facilitates the absorption of toxins, at the same time impedes the circulation through the bowel wall and in this manner delays the general dissemination of poisonous material throughout the body.

On the basis of these observations one may divide obstruction cases clinically into three classes. First, those in which the obstruction is of such recent origin that the formation of toxins has not progressed very far. Second, those in which toxin production has advanced to a dangerous extent but in which the general dissemination of the poisonous material has not yet reached a necessarily fatal stage. Third, those cases which when first seen by the surgeon have passed through the stages of toxin formation, absorption, and dissemination, and in whom a lethal dose has already pervaded the whole organism. In considering these groups from the clinical standpoint the first and third may be dismissed in a few words. For the first group, it may be said that any operation which relieves the obstruction promptly, and deals with whatever organic derangement exists, is all that is necessary. For the third group—those already fatally poisoned—no remedy within our present knowledge is of any avail, and while opera-

* As presented at the meeting of the Section, Dr. Stone's paper was prepared for reading only. This is a condensed form of the paper, written by the author for publication in the Transactions—Ed.

tion may often be done on the chance that improvement will follow, nothing really can be hoped for from such a procedure. In other words, the only prospect of benefiting such patients lies in the discovery of some chemical method of combating the toxin and such chemical method is not yet known. The great second group, which lies between the two extremes, is the one in which improvement of our present methods of treatment may be expected to yield encouraging results.

This group of cases may be considered as being in the following situation:

There is an accumulation of toxin within the lumen of the bowel and a penetration of this toxin into the wall of the bowel, where much of it is still retained because of the impaired circulation, due to distention. Surgical relief of the obstruction and the evacuation of bowel contents may be considered to deal adequately with the toxin within the lumen, but these very measures hasten the generalized dissemination of the toxins in the bowel wall for the following reason. It is obvious that the relief of obstruction and the consequent fall of intra-intestinal pressure permits a rapid return of circulation through the tissues of the bowel wall and with this revived circulation comes a rapid carrying off through the general blood stream of the poisonous substances in the bowel wall.

In order to combat this situation my associates and I are now engaged in some work which is not yet completed. Various expedients were employed in the effort to reverse the direction of toxin movement and to induce its reentry into the lumen of the gut. Of these the most successful have been the free irrigation of the obstructed bowel with considerable quantities of distilled water. So far the experiments carried out have been very encouraging in their promise of success in this endeavor.

The conclusions to be drawn from this study are that obstruction should be relieved as promptly as possible; that the bowel contents should be removed at once at the time of operation; and that the intestines should then be freely irrigated with large quantities of distilled water.

ENTEROSTOMY IN ACUTE ILEUS
THE TIME ELEMENT: A PRELIMINARY REPORT*

FREDERICK T. VAN BEUREN, JR., M.D., F.A.C.S., *ET AL*†

NEW YORK

ENTEROSTOMY as a treatment for acute ileus in humans has been overenthusiastically recommended. A review of some of the recommendations make one wonder whether the enthusiasts knew that the requirements are for successful application of the procedure and upon what principles it rests. Statements have been published to the effect that the mortality in acute ileus cases treated by enterostomy is practically negligible.[1] Enterostomy has been recommended for and done in late rather than in early cases.[2]

Enterostomy, like any other surgical procedure, is chiefly useful when done in the right way, on the right case, at the right time, and indiscriminate recommendation of it as a cure-all, or as a last resort, is ill-judged and unfair.

Let us examine some of the facts regarding results of treatment. In 349 cases in which enterostomy was done among 1089 cases of acute ileus at 7 hospitals of the best class between 1900 and 1924, the mortality was 60.7%.[3] This disposes effectually of the suggestion that it is a cure-all. The lowest mortality that I have been able to find, in a careful report on a fair number of cases by a good operator from a good hospital, is 34.3% in 35 cases.[4]

Let us review the conditions present in acute mechanical ileus (simple intestinal obstruction):

a. There is an obstruction of the intestine.
b. The intestine is over-working against the resistance of the obstruction (below) and the pylorus (above); the muscle begins to "tire out" (lose contractility and tonus).
c. The intraintestinal pressure is abnormally increased.
d. The circulation in the intestinal wall is intefered with by the pressure.
e. The nutrition of the wall suffers: the muscle grows still weaker; the epithelium becomes necrotic. Perforation may finally occur.
f. Poison is present in the intestinal lumen and wall (after the lapse of some hours).
g. It is being absorbed by the lymphatics and entering the blood stream through the thoracic duct.
h. The poison is circulating in the blood and being excreted into the intestine (most rapidly at the upper part, apparently).
i. It is being reabsorbed and reexcreted. Finally, when absorption has sufficiently overbalanced excretion a lethal dose of poison remains in the body long enough to cause fatal toxemia.
j. Abdominal distention due to increased intraintestinal pressure may be great enough to interfere greatly with cardiac and respiratory action.

What are the essential things that successful treatment must accomplish? It must effectively relieve the toxemia and adequately lower the intraintestinal pressure. Theoretically, enterostomy (creating a place of least resistance towards and through which gas and liquid under pressure will flow) should always accomplish these two essentials. As a matter of practical fact, it often fails to do so.

Let us examine theory and fact in an attempt to reconcile them. Theoretically, when we make a competent opening in the intestine in such a case:

a. the intraintestinal pressure is lowered by escape of gas and poisonous liquid;

* Read by title before the Section of Surgery, New York Academy of Medicine, May, 1926.
† From the Laboratories of Surgery, College of Physicians and Surgeons, Columbia University.

b. the vicious circle is broken by decrease of absorption and increase of excretion;
c. the intestinal circulation is improved;
d. the nutrition of the muscle and epithelium is bettered;
e. the toxemia is relieved;
f. the abdominal distention disappears.

In reality, we can accomplish these results only if the following criteria are satisfied:

a. the opening must be made before a fatal dose of poison has been absorbed;
b. there must be no impervious kinking of the intestine between the obstruction and the opening made;
c. the intestinal muscle must retain sufficient tone to be able to expel its contents and to prevent the intestine becoming a thin-walled, flaccid tube;
d. the intestinal circulation must have been sufficiently preserved to prevent necrosis and perforation of any part of the wall;
e. the patency of the opening in the bowel must be maintained until the obstruction has been relieved spontaneously or by operative measures.

In other words, enterostomy must be done before the patient has been fatally poisoned, before his intestinal muscle has lost its tone, and before his intestinal circulation has become hopelessly impaired. Most of its failures are due to its being done too late. It should be done as soon as possible after poison is present in the intestine. This makes it of some importance to determine the time factor required for poison formation so that we can offer a logical recommendation regarding the time when enterostomy ought to be done.

How soon is poison demonstrably present in the intestine after obstruction has occurred? Most of the evidence in regard to this is derived from animal experiment. The toxicity of the intestinal contents in human obstructions has been proven in a moderate number of cases. But it is only in work on experimental animals that we can state accurately the length of time elapsed between the onset of obstruction and the removal of the contents to be tested.

Published results of experimental work regarding the time factor in the formation of ileus poison are rather unsatisfactory. Many investigators reported the time factor for the production of death in the obstructed animal due to simple obstruction or to closed loop obstruction. But comparatively few reported testing the toxicity of obstructed intestinal contents or loop contents by injection into other animals. And when they did report this, frequently no data were given as to time between onset of obstruction and removal of contents for testing their toxicity. The few reports we were able to find that did give the data required may be outlined as follows:

Stone, Bernheim and Whipple[5] found that it took from 24 to 48 hours in dog's isolated, closed duodenal loops to form toxic products which when injected intravenously into other dogs caused the latter's death. The extreme range for this time factor in all their experimental dogs was 24 to 96 hours. Murphy and Brooks[6] found the time factor in dogs to be 72 to 102 hours for obstruction in the duodenum and jejunum. Dragstedt and his coworkers[7] put the necessary time factor at 48 hours for high obstruction in dogs. Murphy and Vincent,[8] working with cats and guinea pigs, stated the time factor as 4 to 7 hours. Kukula[9] found the time factor in various animals to be from 3 to 10 days. Von Albeck[10] made it 24 to 48 hours. They did not specify the level of obstruction. Clairmont and Ranzi[11] said that it was about 5 days in cats and dogs and about 18 hours in rabbits. Saito[12] found that the time factor varied in dogs from 43 hours to about 5 days according to the level of obstruction; poison being demonstrable earlier in the higher obstructions. To summarize: in obstructed intestines the time factor for the formation of poison sufficient to cause marked sickness or death of the animal into which it was injected

was found by different workers to vary from 4 hours to 10 days.

These variations seemed to depend partly upon:

a. the level of the obstruction;
b. the type of obstruction, whether simple or by closed loop and with or without serious trauma to the intestinal blood supply;
c. the preparation of the contents for injection and the amount used;
d. the variety of animal used in the experiment;
e. individual difference of reaction in animals of the same kind.

With the hope of securing some more uniform results upon which to base recommendations regarding the proper time to use enterostomy, an investigation, still unfinished, was begun in February, 1926 in the Surgery Laboratory of the College of Physicians and Surgeons, Columbia University. A group of fourth-year students, Messrs. Herbert Horne, George Inge, Charles McNitt, Russell Tether and Stuart Winning, undertook to do the necessary operative work under my direction and the necessary chemical work under the direction of Dr. Louis Baumann of the Department of Medicine. At the same time, another fourth-year student, Mr. George Knowles, began a search of the literature which furnished the data of other investigators cited above.

Ten dogs were used for obstruction experiments and ten others were used to test the toxicity of the obstructed contents. Every dog of the obstruction series was obstructed as nearly as possible in the same way. Under ether anesthesia and aseptic precautions, a narrow cotton tape was tied tightly around the jejunum at a point 30 cm. from the duodeno-jejunal ligament, taking care not to interfere with the mesenteric blood supply. The wound was closed and the animal was kept under observation in a cage, with plenty of water but no food, until the time arrived to remove the intestinal contents. The ten dogs were divided into two groups of five each. Those of the first group were killed by ether at the end of 72 hours after obstruction; those of the second group at the end of 48 hours after obstruction. The intestinal contents of each dog, with the mucous membrane, was immediately removed into boiling water and boiled five minutes to kill the bacteria. Each specimen was then treated by precipitation and filtration, reprecipitation and refiltration, until a moderately definite product was believed to have been secured. This refined fluid material varied from 10 c.c. to 17 c.c. in amount as used for injection. All of the ten dogs in the toxemia series were treated as nearly as possible in the same way. Under ether anesthesia, the external jugular vein was exposed and the toxin was slowly injected through a small needle. The puncture in the vein was tied off, the wound closed, and the dog placed under observation in a cage for the next five to eight hours. Each dog was observed again the next morning. The results are shown in Table 1.

These results may be summarized as follows: The intestinal contents from every one of the ten obstructed dogs caused toxemia when injected intravenously into a presumably healthy dog. In one case the symptoms (vomiting, purging and general depression) were slight. In five cases they were severe. In four cases death resulted in from 2¼ to 6 or more hours after injection.

We feel justified, therefore, in assuming that at the end of 48 hours, even in simple obstruction with little intestinal damage, there is usually poison in the obstructed intestine which is probably being absorbed and which ought to be removed.

Accordingly, we recommend that enterostomy be done as routine in mechanical ileus cases that have been obstructed for 48 hours or more—except in moribund cases where it can probably do no good and where it may hasten the fatal result. One should like to recommend its use in all cases that have been obstructed more than 24 hours but we have insufficient data as yet to support such a recommendation.

TABLE 1

1926 ACUTE ILEUS SERIES

Showing the presence of toxin in contents of intestine obstructed for 48 to 72 hours, by injecting the refined, sterilized residue thereof intravenously into healthy dogs.

(From the Laboratories of Surgery, College of Physicians and Surgeons, Columbia University)

Serial No. of Obstructed Dog	Serial No. of Injected Dog	Amount of Fluid Injected	Result
72 Hour Obstruction Group			
8240	8315	10 c.c.	Slight toxemia. Recovered completely after 24 hours.
8269	8414	abt. 15 c.c.	Death in 2¼ hours.
8326	8415	18 c.c.	Severe toxemia. Recovered completely after 36–48 hours.
8352	8413	abt. 15 c.c.	Severe toxemia. Recovered completely after 36–48 hours.
8558	8416	17 c.c.	Death in 6–22 hours.
48 Hour Obstruction Group			
8359	8548	17 c.c.	Severe toxemia. Recovered after 48 hours.
8386	8547	10 c.c.	Severe toxemia. Recovered after 48 hours.
8430	8551	16 c.c.	Death in 5–19 hours.
8447	8550	16 c.c.	Death in 5 hours.
8487	8549	14 c.c.	Severe toxemia. Recovered after 48 hours.

Note: The dogs were observed at frequent intervals for 5 or 6 hours after injection and were not visited after that until the following morning.

The recommendation is made not because it is believed that enterostomy will save every case but because we believe it will save more early than it will late cases. And the mortality mounts rapidly after the first 12 to 24 hours of obstruction.

There is pretty general agreement upon an acceptable technique. A rubber catheter of moderate size (we use 12–14 French), and having four or five fenestrae, is sutured into the intestine by Witzel or Kader method. Upper jejunum is the preferable site because the intestinal current is reversed in obstruction and the upper gut, distant from the obstructed point, is usually in better condition than that lower down. Moreover, the upper gut appears to contain more of the toxic material.

Care should be taken that:

a. the intestine is not too much narrowed by the suture;
b. it is not sharply kinked at the place of enterostomy;
c. the tube is sutured to the intestinal wall and fastened by adhesive plaster to the abdominal wall so that it will not be pulled out;
d. the tube to the drain bottle be protected from kinking and be long enough to allow the patient to turn in bed;
e. if the enterostomy is not draining satisfactorily at the end of 24 hours it should be carefully examined and revised if necessary.

It must be kept in mind that early operation is of prime importance in all cases of acute mechanical ileus and that enterostomy is merely a surgical procedure that may accompany or precede relief of the obstruction with the object of lowering the mortality of the entire series. And it must be remembered that we have as yet insufficient proof to claim its absolute efficacy. It is still on trial, and its results should be the more carefully checked for that very reason.

REFERENCES

1. McKinnon: *Jour. A. M. A.*, lxxvii, 273.
2. Taylor, Sir Wm.: *Surg. Gyn. & Obst.*, xxxviii, 270 (editorial).
3. van Beuren, F. T., Jr., and Smith, B. C.: "The Status of Enterostomy in the Treatment of Acute Ileus," in course of publication.
4. Wortman, W.: *Med. Klinik*, 1921, xvii, 932.

5. Whipple, Stone and Bernheim: *Jour. Exp. Med.*, 1913, xvii, 307; idem, 1914, xix, 144–166; *Bull. Johns Hopkins Hosp.*, 1912, xxiii, 159.
6. Murphy and Brooks: *Archiv. Int. Med.*, 1915, xv, 392.
7. Dragstedt et Al.: *Am. Jour. Physiol.*, 1918, xlvi, 366.
8. Murphy and Vincent: *Boston Med. & Surg., Jour.*, 1911, clxv, 684.
9. Kukula: *Archiv. f. klin. Chir.*, 1901, lxiii, 773.
10. von Albeck: Ibid., 1901, lxv, 569.
11. Clairmont and Ranzi: Ibid., 1904, lxxiii, 696.
12. Saito: *Mitt. a. d. Med. Fakult. d. k. Univ. zu Tokyo*, 1924, xxxi, 117.

PRESENTATION OF CASES

CHRONIC TEMPOROMAXILLARY SUBLUXATION

JOHN H. MORRIS, M.D.

In February, 1926, a young man reported with the complaint that his left temporomaxillary joint slipped in and out whenever he opened his mouth to speak or eat. In 1920, he had suffered a fracture of the inferior maxilla and after the removal of the retentive dressing he says he noted that the left side slipped out of joint very easily. This condition became progressively worse until the snapping noise which accompanied the joint slipping became so loud and conspicuous as to seriously embarrass him in his work. Recently the opposite joint had also appeared to grow loose although not to the same degree as the originally affected side.

As the patient opened his mouth to speak, the inferior maxilla on the left side slipped forward out of its glenoid cavity onto the zygoma with a clattering noise audible throughout the room. At rest, it was observed that the joint was abnormally loose. *X*-ray examination showed normal joint outlines but upon depression of the lower jaw, the head of the inferior maxilla rode directly forward out of its cavity to a point beneath the zygoma.

Operation. Longitudinal incision just in front of the external ear. The temporal artery and vein and branch of occipital nerve pulled posteriorly. Horizontal incision along root of zygoma opening outer leaf of capsule of parotid gland. Gland, with branches of facial nerve, displaced downward and forward, particular care being taken to protect the orbicular branch of this nerve which very nearly overlies the joint. Temporomaxillary joint exposed, capsule incised longitudinally and joint cavity explored. Joint surfaces found roughened and eburnated. Joint meniscus was not to be found; evidently having been destroyed or absorbed following old joint injury. Joint capsule now reefed, a detail easily accomplished owing to the relaxed capsule, and wound closed.

Postoperative course. Primary union. Early active and passive motion. The joint rapidly regained complete range of motion without pain; the noise formerly associated with its function was eliminated; and the opposite joint seemed to regain its stability.

Comment. The approach to the joint is rather difficult because of related important structures. The disturbance in function in this joint may be attributable to the loss of the meniscus which permitted an undue relaxation of the capsule, which in turn explains the abnormal mobility. This condition was evidently counteracted by taking up this laxity through suture, thus stabilizing the joint.

PYLORIC RESECTION FOR ULCER OF THE DUODENUM

JOHN H. MORRIS, M.D.

This patient, a male 47 years of age, was admitted to the Fourth Surgical Division, Bellevue Hospital, June 19, 1925 with a history of two months of epigastric pain and indigestion. The pain was severe, generalized over the upper abdomen and usually appeared two to three hours after taking food. The attacks were always associated with nausea and quite frequently with vomiting, which afforded much relief from the distress. The bowels had been quite regular until two weeks preceding admission when he began to be troubled by diarrhea. His appetite had remained fairly good throughout his illness although his food intake had been voluntarily restricted because of his fear of pain induced by food. He felt that he had lost considerable weight and strength since the onset of his trouble.

In 1917 he was operated upon for acute appendicitis and thereafter felt very well until the onset of the above symptoms. He also had an attack of pleurisy in 1917. There was no history of venereal infection.

He was a thin, emaciated, apprehensive individual presenting no evidence of acute illness. His abdomen was of the elongated,

scaphoid type with scar in right lower quadrant. No tenderness or masses could be detected. At the apex of the right lung, there was some dullness, and a few subcrepitant râles could be heard. Physical examination otherwise negative. Urine, negative. Blood count: w.b.c., 12,600; polynuclears, 90 per cent; lymphocytes 9 per cent. *X*-ray examination showed pronounced filling defect in the duodenum with some retention of the meal after 6 hours. Wassermann reaction negative.

Operation. Findings: Cicatricial infiltration diffuse through pylorus and first portion of duodenum. Gall bladder thickened and bound down so intimately to duodenum as to be almost indistinguishable.

Procedure: Gall bladder dissected out, cystic duct identified and gall bladder removed from below upwards. Mobilization of the pylorus and duodenum started from the gastric side, lesser omentum cut and tied, pyloric and left gastric arteries cut between clamps and ligated. Greater curvature then isolated in a similar manner and Payr crushing clamp applied at the pyloric region of the stomach wall proximal to area of cicatricial infiltration. Stomach then amputated between clamps and turned distally in an effort to mobilize duodenum which was accomplished through first portion. During dissection at this point, the friable tissues of the duodenum tore completely through, leaving the ragged, infiltrated stump of duodenum wide open. The mucous membrane of the duodenum was then closed by continuous chromic catgut suture. Attempts to close serosa and unite it for efficient closure over the stump failing because of the infiltration of the walls, the closure was completed by displacing the posterior peritoneum covering the pancreas laterally in such a way as to permit suturing of the latter over the incompletely closed duodenal stump after the manner of an inverted cup. The edges of this cup were pulled well down over the duodenum and sutured closely about it in the comparatively healthy tissues of the second portion. Operation was completed by anastomosing the jejunum to the cut end of the stomach after the manner of Polya.

The postoperative course was uneventful and the patient was discharged from the hospital within three weeks. He has been absolutely free from digestive symptoms and has gained very rapidly in health, weight and strength.

Comment. This case is presented because of interesting features relating to the method of closure of the duodenum. Serosa closure could not be effected and the substitution of posterior peritoneum without consequent leakage or fistula suggests the method as a routine plan in closure of duodenal stumps in this operation where leakage and fistulae often determine a fatal outcome.

RESECTION OF STOMACH FOR CARCINOMA: THREE YEARS AFTER OPERATION

JOHN H. MORRIS, M.D.

A female, 48 years of age, was admitted to the Fourth Surgical Division, Bellevue Hospital, with marked carcinomatous cachexia. Digestive symptoms had begun but three months before admission with gaseous distention after food. One month later, she noted epigastric pain two hours after meals accompanied by general abdominal distention, heartburn and "lumps" or "knots" in the upper abdomen. Appetite was fairly good but the diet was limited by desire to eliminate the distress which followed eating. Recently she had frequent spells of vomiting, the vomitus being dark, of foul odor and containing much undigested food. She reported a loss of about 20 pounds in weight during the last 6 months.

She had never experienced any heart or lung trouble but had had influenza in 1922. She had also complained of a right inguinal hernia for many years. She had been pregnant ten times, going through normal deliveries and had had 5 or 6 miscarriages. There was no history of malignancy in the family.

The patient was extremely emaciated, pallid and weak. The skin was very dry and loose. The abdomen was retracted and the muscles were lax and wasted. In the upper right quadrant, there was a hard, freely movable, painless mass apparently about the size of an orange. The right kidney was moderately ptosed and liver edge was readily palpable. There was a large left inguinal hernia. Examination otherwise negative. The urine showed a trace of albumin. Blood count: r.b.c., 2,400,000; hemoglobin, 35 per cent; w.b.c., 7,400; polynuclears, 59 per cent; lymphocytes, 37 per cent. *X*-ray examination: Complete pyloric obstruction with tremendous dilatation of the stomach which filled almost the entire abdomen; diag-

nosis: calloused ulcer with probable malignant degeneration.

Operation. Preliminary transfusion of 700 c.c. of blood. Findings: Large annular mass occupying the pylorus. Greatly dilated stomach. Gastric mass freely movable. Subpyloric glands greatly enlarged.

Procedure: Lesser omentum freed from stomach between ligatures. Ligature of pyloric and left gastric arteries. Greater omentum similarly freed from greater curvature and arteries ligated. Duodenum then amputated between Payr clamps, stump inverted and buried within serosal overlap. Payr clamp then applied to stomach tangential to lesser curvature and distal portion removed between clamps. Loop of jejunum then brought up anterior to transverse colon and anastomosis made between it and cut end of stomach after method of Polya-Balfour.

The pathological report was ulcerating adenocarcinoma of the stomach.

The postoperative course was very placid and the patient was discharged from hospital 19 days after operation. During the ensuing two years she has gained from her admission weight of 90 pounds to 140 pounds and has had no digestive distress of any sort.

Comment. This case is shown as a three-year result in a case of well advanced carcinoma of the stomach presenting originally a hemoglobin percentage of 35, a tremendous gastric dilatation and an excessive degree of emaciation.

TORSION OF THE OMENTUM

JOHN H. MORRIS, M.D.

This patient was admitted to Post-Graduate Hospital as an acute emergency on January 28, 1926. Two days previously, he had been seized with severe, generalized abdominal pain associated at the onset with nausea and vomiting. During the ensuing twelve hours the pain had localized itself in the right lower quadrant and there remained continuous up to the time of admission. Bowels constipated, no diarrhea and no urinary disturbances.

The man's previous health had always been good and he had never before experienced similar attacks nor had had any type of digestive disturbance.

He was an obese, robust, young, white male. His temperature (rectal) was 102° and his pulse rate 110. His abdomen was distended tympanitic; and generalized muscular rigidity precluded the possibility of detecting intra-abdominal masses. The rigidity was particularly marked over the entire right rectus muscle and here the acute tenderness appeared to be concentrated. Urinalysis, negative. Blood count w.b.c., 16,600; polynuclears, 83 per cent; lymphocytes, 17 per cent. Preoperative diagnosis: ruptured appendix with general peritonitis.

Operation. Right rectus incision. Upon opening the abdomen, a large, firm brownish-red mass appeared to fill the right side of the abdomen. This mass proved to be engorged and congested omentum which was twisted upon itself seven distinct turns. This torsion had taken place in close proximity to the attachment of the omentum to the transverse colon and at this point the entire omentum was gathered into a narrow pedicle, distal to which was the large, red, beefy mass represented by the completely involved omentum. A complete removal of the omentum was done. The appendix was found definitely involved in a subacute inflammatory process, and it was accordingly removed. Pathological report: subsiding acute appendicitis; hemorrhagic infarction of twisted omentum. The patient enjoyed an uncomplicated recovery.

Comment. The features to be emphasized in this case are: the torsion of the omentum in association with a subsiding acute appendicitis which was evidently the inciting cause of the omental lesion; the obesity of the subject, which was evidently a contributory factor due to excessive fat deposit in the omentum; and finally the involvement of the entire omentum in this case, which is not usually observed.

TORSION OF THE GREAT OMENTUM: RESECTION

JOHN H. GARLOCK, M.D.

An Italian housewife, aged 43 years, was admitted to the Second Surgical Division of the New York Hospital, July 15, 1925 and was discharged July 30, 1925. She complained of pain in the right lower quadrant of one week's duration. One week before she was admitted, she was seized with sudden pain in the lower abdomen. This gradually localized in the right lower quadrant and remained in this situation. It was severe and at times cramp-like. There was no nausea or vomiting. She felt feverish for a few days and also complained of general

malaise. The pain was severe enough to confine her to bed. An ice cap relieved her somewhat. Her bowels were constipated. There were no urinary symptoms. Her menses were regular, the last one occurring three weeks before.

Her past history was completely negative. She had never had a similar attack and never complained of gastrointestinal disturbances.

She was a well-developed and well-nourished woman acutely ill. General physical examination was negative. The abdomen was moderately distended and rather tense all over but the muscle rigidity was more marked in the right lower quadrant where tenderness was acute. In this region there was also rebound tenderness. Palpation gave the sensation of a mass in the right lower quadrant but this was not very definite. There was no demonstrable fluid. Pelvic examination showed tenderness high up on the right side but no masses. The fundus of the uterus was not enlarged and was freely movable. Temperature 101°; pulse 92; w.b.c., 14,950; polymorphonuclear leucocytes 84%. Urine showed a trace of albumin.

Because it was felt that the patient had acute appendicitis with abscess formation, a McBurney incision was made. On opening the abdomen, the base of the appendix was isolated and the appendix itself was found to be retrocecal and firmly bound down, measuring about 4 inches in length. Digital exploration mesially showed a mass lying along the inner side of the cecum. This was readily brought into the wound after a Weir extension had been made. After delivering the mass into the wound, it was found to be omentum twisted on its longitudinal axis with 4½ turns to the right. It was free at its distal end and was markedly edematous and hemorrhagic. There were about four ounces of bloody fluid in the pelvis. The procedure consisted of an appendicectomy in a retrograde direction without inversion of the stump and a resection of the twisted omentum by serial ligation. Two cigarette drains were inserted, one to the base of the appendix and the other into the pelvis. Convalescence was smooth and the patient was discharged on the 16th post-operative day.

This case is presented, first, because of the interest which attaches to this pathological condition and second, because an intraabdominal torsion of the omentum of the so-called idiopathic variety is quite rare. In this type of torsion, the extremity of the omentum is not attached. Ordinarily, the distal end of the omentum is found attached to either an inflammatory lesion in the pelvis or a hernial sack.

TRAUMATIC RUPTURE OF SPLEEN: SPLENECTOMY

JOHN H. GARLOCK, M.D.

This patient, a nurse, 42 years of age, was admitted to the Second Surgical Division of the New York Hospital March 12, 1926, at 7:30 P. M., with the following history:

She had been struck a glancing blow by a skidding taxicab and thrown to the curbstone. Whether the cab struck her left side or she fell to the curb on her left side, it is impossible to state. There was no external evidence of injury. She was brought to the hospital unconscious, but revived in bed in the reception ward. The wheel of the taxicab did not pass over her body. Soon after her admission, she vomited once. Her only complaint was pain in the upper chest with slight difficulty in breathing. She was in acute shock: skin very pale, extremities cold; pulse imperceptible. There was a laceration of the forehead and a fracture through the middle of the right clavicle. Heart and lungs were negative. There was no evidence of injury to the chest. The abdomen was slightly distended but quite soft throughout. There was slight tenderness in the epigastrium. There was dulness in the flanks but no fluid wave or shifting dulness. W.b.c., 12,800; polymorphonuclear leucocytes, 70%; r.b.c., 3,220,000; Hgbn. 55%. Temperature 98.6°. Blood pressure 100/70. Urine negative. Because of the vagueness of the symptoms and signs, it was decided to wait. An infusion of 700 c.c. of saline solution was given with only slight improvement in the pulse. At 8:30 P.M., it was noted that the pulse was somewhat improved. At this time, the patient complained of severe pain in both shoulders, more marked on the left side. The abdomen was now somewhat more distended with very little, if any tenderness in the upper quadrants. The dulness in the flanks remained about the same. W.b.c. 33,600; 92% polymorphonuclear leucocytes; Hgbn. 55%. At this time, a diagnosis of ruptured spleen was made on the signs of intraabdominal bleeding and the persistant left shoulder pain. Operation was advised, but refused until 11 P. M.

The operation was started with local anesthesia. When it was found necessary to deliver the spleen, ethylene was administered. An

upper left rectus incision was made. On opening the peritoneum, a large quantity of blood was evacuated. Rapid manual exploration in the splenic area showed a stellate laceration of the convex surface and a deep jagged wound at the hilus. The spleen was easily delivered into the wound. Clamps were then applied to the pedicle, which was ligated serially with double ligatures of chromic catgut. The peritoneal cavity was hurriedly cleansed of blood clots. Because of the poor condition of the patient, through-and-through silkworm-gut sutures were used in closing the abdominal wound. The operative time was 14 minutes. Immediately following this, a transfusion of 800 cc. of blood was admininstered by the Lindeman method. The usual shock methods were instituted. The patient had an unusually smooth convalescence and the wound healed by primary union. She was discharged on the 15th post-operative day.

This case is shown to illustrate the occasional difficulty in the early diagnosis of intraabdominal injury with hemorrhage and also to call attention again to the sign of referred shoulder pains which is a fairly constant symptom in these cases. The remarkably smooth convalescence is also noteworthy.

COMPOUND FRACTURE OF THE TIBIA INVOLVING THE KNEE AND ANKLE JOINTS: EARLY RESULT

JOHN H. GARLOCK, M.D.

A man aged 45, was admitted to the Second Surgical Division of the New York Hospital February 18, 1926. About thirty minutes before he was brought to the hospital in an ambulance, he was adjusting the apparatus in a washing machine which was empty at the time, when the current was suddenly turned on. In order to escape the revolving blades he leaped clear of the apparatus with the exception of his right leg which was caught. He sustained an injury involving his knee, leg and ankle. Examination showed along the inner side of the right knee, a lacerated wound about 12 cm. in length which involved the knee joint. There was extensive trauma to the skin and joint capsule. Part of the inner condyle of the tibia was missing. There was a long laceration along the shaft of the tibia with avulsion of the periosteum and the skin. There was another laceration along the inner side of the ankle with avulsion of the tip of the internal malleolus exposing the ankle joint. At operation, it was found that the inner condyle of the tibia had been cut away in an oblique direction as though by a knife, and with it had been removed about two-thirds of the internal meniscus. The capsule of the joint was frayed out. The other joint structures were found to be intact. The wound of the ankle had caused considerable crushing of the skin and fascia. The internal malleolus was gone and the ankle joint was exposed. The procedure consisted of thorough scrubbing with soap and brush, with irrigation by saline solution, then benzine for the skin. The tissues and the joints were thoroughly flushed with ether. The skin and the lacerated wounds were then painted with iodine. All the tissues were then thoroughly débrided. The capsule of the knee joint was sutured with mattress stitches of chromicized catgut and the wound was closed without drainage. The ankle was treated in the same way and the lower end of the tibia was removed by rongeur. This wound was also closed without drainage. Releasing incisions were made in the skin on either side of the laceration. A plaster splint was then applied. Five days later all the sutures were removed; the wounds had healed by primary union. Active motion was started on the fifth day. The plaster splint was discarded on the tenth day. The patient was allowed up on crutches on the eighteenth day and was discharged from the hospital March 23, 1926. He is now receiving baking and massage. At the present time, the knee can be fully extended and flexed to a right angle. Motion in the ankle joint is practically normal.

ACUTE INTESTINAL OBSTRUCTION: ENTEROSTOMY WITH RECOVERY

BRADLEY L. COLEY, M.D.

Case 1. R. P., male, 25, admitted to Bellevue Hospital March 28, 1926, had been operated upon March 1, 1926 for an acute appendicitis with spreading peritonitis. The appendix had ruptured close to the base and there were no walling-off adhesions. The pelvis and lower abdomen were filled with thin, odorless pus. The appendix was removed and drainage instituted by means of three cigarette drains. Culture from peritoneal exudate-streptococcus.

After a few days of stormy convalescence, the patient did well, the wounds healing satisfactorily.

He was in good health until ten P.M. of the night of the second admission, when he began to have excruciating, cramp-like pains in the lower abdomen. He vomited three times after admission. He was treated for twenty four hours by lavage, colon irrigations, enemas, turpentine stupes and morphine. Relief being negligible, laparotomy was performed. Adhesions were found throughout lower half of abdomen. On separating these adhesions, clear fluid was evacuated and small intestine was delivered. Some of these loops were distended with gas and others were entirely collapsed. There were two separate points of obstruction: one where the intestine was adherent to the anterior abdominal wall at the site of the previous incision; and the other was bound down by a thick cord-like adhesion to the posterior parietal peritoneum on the left flank.

Operative procedure consisted in separating the adhesions by blunt dissection, performing an ileostomy, using a No. 20 catheter, by means of two purse-string sutures. The end of the catheter was brought out through a stab wound in the left flank; the laparotomy wound was closed without drainage.

There was uneventful recovery, the ileostomy opening closed promptly, and the patient has all wounds firmly healed, and no recurrence of symptoms.

Case II. A-18173. W. D., six years old, female, was admitted to the Hospital for the Ruptured and Crippled with a history of having been acutely ill for four days. The onset was sudden, with pains in the abdomen and violent vomiting. A physician prescribed calomel and castor oil without relief. The pain localized in the right lower quadrant, and vomiting continued.

The past history was negative except for measles at five years and a history of loss of weight and appetite for two months. The physical examination was essentially negative except for the abdomen, where there was marked tenderness and rigidity over McBurney's point with an indefinite sensation of a mass in this region. The diagnosis was acute appendicitis, and the child was operated upon.

There was an abscess in the right lower quadrant, chiefly lateral to the cecum, filled with thick, creamy pus with a colon bacillus odor. The appendix was retrocecal, perforated at the tip and lying in the abscess cavity. The operation consisted in the removal of the appendix through an intermuscular incision and drainage of the abscess with a cigarette drain.

Following operation, the temperature, which was 102° on admission, fell to 99°, and for the first five days postoperative did not reach above 100°. Appetite was good and soft diet was well tolerated. The bowels moved freely with enemas and convalescence seemed very satisfactory. On the sixth postoperative day the temperature rose to 101°, but fell rapidly to normal and remained normal on the seventh and eighth postoperative days.

A distinct change occurred on the ninth day when persistent vomiting began, accompanied by a rise in pulse rate, but not associated with elevation in temperature. The stomach was intolerant of fluids and even water in small amounts was promptly expelled by forceful vomiting. The bowels did not move and failed to respond to enemata, irrigations, and hot applications to the abdomen. Lavage failed to control the vomiting and a diagnosis of mechanical ileus, complete, was made on the tenth day.

On the afternoon of the tenth postoperative day, for the purpose of performing an enterostomy, a left rectus-splitting incision at the level of the umbilicus was made under a light gas-oxygen and ether anesthesia. Distended small intestine presented, the serosal surface of which showed no evidence of peritonitis. The precarious condition of the child precluded extensive exploration, but it was possible to make out a collapsed small intestine in the lower portion of the abdomen. It was assumed that a loop of small intestine had become adherent to a part of the appendiceal abscess wall. Certain it is that the condition was not a so-called paralytic ileus, as is seen in severe peritonitis. Jejunostomy was performed in the most convenient loop of the distended gut, the catheter being held in the lumen with a double purse-string suture.

Although in desperate condition, the patient withstood the second operation remarkably well. Gas and liquid feces were freely expelled through the tube. There was no forceful vomiting and the marked abdominal distension rapidly subsided. On the fifth day after the second operation the tube became loosened and was removed. Thereafter, the bowels moved through the sinus. Prior to the removal of the tube, a half saturated solution of magnesium sulphate was introduced at three-hourly intervals and flaxseed poultices and pituitrin ½ cc.

hypodermatically were given and seemed to be of value in causing renewal of bowel activity.

A transfusion of 300 cc. of whole blood was administered on July 23rd, six days after the second operation, by the direct syringe method, the father serving as donor (both Group #1, Jansky) as loss of nutrition and duration of illness had considerably weakened the patient. The fecal discharge, which was obviously high intestinal, caused a very severe excoriation of the wound, necessitating meticulous care in dressings. A thick zinc oxide ointment appeared to give the best protective covering and under this treatment the excoriation rapidly cleared. About the seventh day the bowels began to move freely by rectum and, from this time on, a progressively greater proportion of fecal matter was discharged by the normal route with less and less escape through the enterostomy wound.

The wound slowly healed and the patient was discharged on August 20th, forty-six days after the first operation and thirty-six after the operation for the obstruction. A tiny granulating area at the site of the enterostomy remained at time of discharge, but there was no escape of gas or fecal matter from this area and shortly after discharge from hospital it had firmly healed.

JEJUNOSTOMY FOR ACUTE ILEUS

RALPH COLP, M.D.

Case I. S. G., age 28, admitted to the service of Dr. Beer, Mt. Sinai Hospital, June 8, 1925.

Chief complaint was the inability to void through the urethra and drainage of urine through a suprapubic sinus which had persisted since an attempt had been made elsewhere to remove some vesical calculi, which, instead of being present in the bladder, were hidden in a diverticulum. Accordingly the patient was operated upon by Dr. Beer, June 12th. The bladder was mobilized extraperitoneally and three bladder diverticula, one of which was full of facetted stones, were removed. The dissection was extremely difficult because of the massive peridiverticulitis, and the peritoneum was opened in several places. The bladder was reconstructed and drained suprapubically.

Ten days after operation the patient began to vomit about 20 ounces of yellowish, bile-tinged fluid with some undigested food. There was moderate epigastric distention, no abdominal distention or rigidity. Rectal examination revealed induration and tenderness about bladder base. Temperature normal. Lavaged and given ox gall enema with fair result. Blood figures elevated to—urea 23.8, n.p.n. 51.2, uric acid 3.5, and creatinin 1.3. For next two days ceased vomiting although nausea was present and there was slight distention. Enemata were effectual.

June 26th, complained of abdominal cramp-like pains and exhibited marked distention with visible peristalsis and typical intestinal erections. Rectal examination disclosed hard exudate along left pelvic floor and above this tender, distended loops of intestine were palpable. A diagnosis was made of subacute intestinal obstruction due to plastic exudate. Through a high left abdominal incision a tube was passed into the first loop of jejunum which was definitely dilated. The jejunostomy drained well from the start. After 1 week drainage of urine took place.

July 2nd jejunostomy tube removed. Following this there was considerable discharge of small intestine contents.

June 17th, tract was healed.

Case II. J. P. age 29, admitted to the service of Dr. A. V. Moschcowitz, Mt. Sinai Hospital, July 7, 1924.

Typical history of acute appendicitis. Operation through a right Kammerer incision disclosed a gangrenous appendix with abscess. Cigarette drain to pelvis. The patient did well. The tube was gradually shortened and tube was removed. On July 20th wound strapped and patient up and about.

July 23rd, patient at midnight began to complain of epigastric distress, soon followed by severe cramps with vomiting. Believing that he was suffering from some dietary indiscretion he was lavaged and castor oil left in his stomach, but he soon vomited the medication.

The following morning there was marked tenderness in the upper quadrants of the abdomen and in the umbilical region. An ox-gall enema at 2.30 P. M. evacuated flatus and fecal material but the vomitus began to assume a "spill over" type. Began hiccoughing for a few hours.

July 25th, temperature and pulse normal, blood count 15,800, 86% polys.

1 A. M. Enemata were ineffectual and believing the man to be suffering from an acute intestinal obstruction, a jejunostomy

(Witzel type) was performed through a left high incision in the anterior axillary line at a level with the 11th rib, and a tube was inserted into the first loop of jejunum. At operation the intestines were congested and markedly distended.

Inasmuch as enterostomy drained but little, an ox gall enema through the jejunostomy tube was given after 12 hours and fair return was brought forth. Drainage was free from then on.

Eight days later, flatus and feces passed by rectum and tube was removed. Although the jejunostomy drained for a considerable time, sinus healed and patient was discharged September 2, 1924.

EDITORIALS

TOBACCO PAINS

THE trained surgeon knows that, confronted with a case of abdominal pain, there are two sets of causes he must exclude: intrathoracic—especially pneumonia, and spinal—especially tabes. There is another cause of abdominal pains which, being rare in its incidence, appears to be scarcely known—chronic poisoning by tobacco smoke. We have happened to find but one reference to it, viz., Sir Clifford Allbutt's article on tobacco poisoning in his own System of Medicine. He said "After vertigo, symptoms referable to the stomach and heart are most frequently found. A grinding pain of a peculiarly disquieting kind may come on fifteen to thirty minutes after food: this pain I believe to be due to hyperacidity." In the two cases that we have observed the abdominal pain was not related to meals and was not relieved by alkalies. In both cases it was sometimes severe, although not violent, colicky or cramplike. It was rather vagarious as to time of onset and duration. In one individual it occurred most often at night, waking him from sleep. In him it appeared day or night, or both, for several months, beginning soon after he had abandoned smoking because of other severe symptoms. In the other individual who, also, had several times stopped smoking because of precordial pains, the abdominal complaint lasted over a period of two or three weeks. In both cases an organic abdominal lesion could be excluded, clinically, by the complete absence of gastro-intestinal symptoms, of localizing symptoms, of tenderness, of rigidity and of fever. In the milder case the pains were chiefly epigastric; in the more severe and protracted case the pains, also across the midline of the abdomen, were at various levels. The diagnosis was made in both cases from the fact that the individuals had also suffered cardiac pains whenever they were smoking and for a longer or shorter period after discontinuing the indulgence.

That tobacco smoke can, and does, cause cardiac pains, anginal in character, is also not generally recognized by the profession. The condition has been described quite fully, however, by Allbutt and recently by Rolleston (*Lancet*, May 22, 1926) and is referred to, usually briefly, by some other medical writers. Sometimes the angina of tobacco poisoning is very violent: severe gripping pain in the heart and in the left arm (flexures of elbow and wrist, especially), associated or not with bradycardia or other disturbances of the pulse. Sometimes it comes on only upon slight exertion (not with the sense of alarm associated with so-called true angina, but severe enough to make the individual stop at intervals while walking even slowly) or after a heavy meal or from emotional excitation.

Without attempting a discussion of the more or less dubious distinctions between the "true" and "false" varieties, we cannot refrain from expressing the belief that angina is far more often due to poisoning by tobacco smoke than is generally appreciated. Moreover, when there is reason to believe, or to suspect, that an individual has become thus sensitized to tobacco, it is folly to tell him—or her—to moderate the indulgence. *It must be stopped completely*. And, too, its interdiction for a few weeks is not long enough to exclude tobacco as a cause of cardiac pains (or other symptoms) nor, often, to effect a cure. When an individual has become quite tobacco-sensitized it may take several months before the distress ceases entirely. For a long period, too, he may find that an atmosphere charged with others' tobacco

smoke will give him cardiac (or abdominal) pains. Allbutt said (of himself, it appears): "One case is known to me of a man whose general health is excellent, who is by no means a neurotic subject, and whose heart stands work well in all other respects [he was an Alpine climber and died only recently, aged nearly ninety], in whom intermittence of the heart may occur for many days if he remain for an hour or two in a room with many smokers. He dare not sit in the smoking room of his club or in the smoking compartment of a railway carriage. The intermittence may not begin until the next day or the next but one, but then comes on with the certainty of a laboratory experiment . . . He never suffers from any cardiac disorder unless exposed to tobacco . . ."

Whether an individual is a heavy or a moderate smoker is often not important. Many people tolerate fairly continuous smoking without any apparent ill-effect; some people develop symptoms from comparatively mild indulgence. To be sure, many of those who have suffered from the more familiar tobacco disturbances—nervousness, insomnia, palpitation, pharyngitis—may be quite relieved by reducing their dose of poison. But those who have had the symptoms we have been discussing had better give up the weed for good.

We have wandered a bit from the limitations of a surgical editorial, yet less than might appear at first blush for it is interesting to observe what various conditions tobacco poisoning may mimic. Thus it may cause stabbing or pressure pains in the chest, pains radiating to the shoulder and, according to Allbutt, various neuralgias—in one case of the anterior crural nerve. In the more severe of the two cases we have referred to the pain often went from heart to abdomen or vice-versa.

Now that smoking has become a general habit, indulged in by women and adolescent girls (many of them addicts), it behooves both surgeon and physician to be all the more on guard to recognize it as a cause of some of the conditions he is called upon to treat.—W. M. B.

APPENDICECTOMY

LOCAL ANESTHESIA. TREATMENT OF THE STUMP

When the diagnosis of appendicitis is in doubt and exploration may be necessary, when appendicitis is associated with an omental mass, an abscess or peritonitis, general anesthesia is, of course, indicated—as it is, indeed, for most abdominal operations. There are, however, some cases of appendicitis, in which the diagnosis is beyond reasonable doubt and in which the local conditions make acceptable (and the patient's general condition or inclination makes desirable) the employment of local anesthesia. To this procedure incision through the right rectus sheath—with retraction of the muscle (Kammerer, Battle, Jalaguier) or separation of its fibers—the approach which many surgeons prefer for appendicitis operations, does not lend itself well. The McBurney incision is better adapted to infiltration anesthesia. Sometimes still better is a simple transverse incision through the layers of the abdominal wall lateral to the rectus and its sheath. Beginning in the right lumbar region, below the level of the umbilicus and somewhat lateral to the anterior superior spine of the ilium, the skin is infiltrated with the anesthetizing solution and divided, and then in turn each of the musculoaponeurotic layers is infiltrated and divided up to the outer edge of the rectus sheath, and in the same transverse line as the skin. Fleshy fibers of the obliquus internus are thus cut across, but this is not harmful. If the incision is carried further out, as may be necessary, external oblique muscle fibers are likewise divided. Space may also be gained medialward by carrying the incision somewhat into the rectus sheath. As contrasted with McBurney's gridiron incision, very little retracting is necessary, which is an important consideration when the patient is not narcotised.

If the appendix is immediately accessible and can be handled with no traction the operation can be completed without any discomfort. On the other hand, pulling upon the appendix or intestine and their mesenteries causes great distress. The appendix having been gently delivered, its base, subserously, and the base of its mesentery are infiltrated with the solution through the line of proposed ligation.

When amputating these structures for the ligature method of treating the stump it is a good practice to pass a double strand of stout catgut through the mesenteriolum close to the appendix, one strand to be tied very tight about the appendix and the other tied about the mesenteriolum. In this way the surgeon can be sure that no bloodvessel escapes between the two ligatures. The mesenteriolum is cut across with scissors and the appendix is divided, between the ligature and a clamp, with a knife blade dipped in pure phenol. The surface and lumen of the stump are further cauterized, as may be necessary, with the point of a hemostat dipped in phenol. The stump is wiped with gauze, but it is not necessary to apply alcohol to neutralize the carbolic acid. This simple ligation and sterilization constitute the entire treatment of the stump. It drops off in a few days and is absorbed, leaving a normal smooth serous surface at its former cecal attachment.

Theoretically, this ligation method does not appear to be as surgical a procedure as inversion of the stump and suture of the cecum; but ample experience has shown it to be fully as safe. For at least thirty years the method has been employed by a minority of surgeons, and it has been growing into more general favor. If one sutures the cecum over the *ligated* stump there is formed in the cecal wall a sealed cavity containing a sloughing body, and this sometimes causes trouble. If one inverts the *unligated* stump into the cecum it sometimes happens that hemorrhage takes place from an untied vessel; and occasionally it happens that just as the stump is being turned in gas or feces escapes through it from the cecum. Aside from all other considerations, however, the ligation treatment of the appendix stump has the advantages of speed and simplicity.—W. M. B.

PROGRESS IN SURGERY

Selections from Recent Literature

BRITISH MEDICAL ASSOCIATION, SECTION OF SURGERY

THE PLACE OF GASTRO-JEJUNOSTOMY IN GASTRIC AND DUODENAL SURGERY. *British Medical Journal*, September 25, 1926

I. HERBERT J. PATERSON, London

There are some who consider gastro-jejunostomy an out-of-date operation. More complicated but less rational measures have been designed to supersede it.

That partial gastrectomy is a more certain cure has still to be proved. The operation of partial gastrectomy in the treatment of gastric ulcer is on trial, but the interval which has elapsed since it became a fashion is not long enough to judge the permanency of the cures. It is already certain that partial gastrectomy is not infallible. It is certain that the mortality rate is higher.

The teaching that the common fate of a gastric ulcer is to become cancerous is an insidious heresy.

That partial gastrectomy is less likely to be followed by jejunal or gastro-jejunal ulcer may or may not be true. In the early days of gastro-jejunostomy a reason urged in favor of the posterior operation was that it was never followed by a jejunal ulcer. Indeed, it was a good many years after its introduction before a jejunal ulcer was reported as following this operation. Now we know that secondary ulceration is at least not less frequent after the posterior operation than after the anterior method.

Paterson's experience is that the good results of the anterior operation are better than the good results of the posterior operation. Consequently, since the war he has adopted the anterior method almost exclusively.

In a series of 500 gastric and duodenal ulcers treated by gastro-jejunostomy over 80 per cent. are cured (follow-up).

The most serious remote complication of gastro-jejunostomy is a jejunal or gastro-jejunal ulcer. There were twelve instances of this in the present series (2.4 per cent.). In eight instances the secondary ulcer followed the anterior operation (2 per cent.), and in four instances the posterior operation (3.6 per cent.). In three instances the result was fatal—in one case from a perforation, fatal before any operation could be performed, and in two others, in both of which the ulcer perforated into the colon, death followed the second operation. Whether or not secondary ulceration be more frequent after the posterior method, there can be no question that after this operation it is far more difficult to treat. Operation for a gastro-jejunal ulcer following the posterior operation is one of the most difficult, if not the most difficult, task in surgery. After the anterior operation the surgical treatment of a gastro-jejunal or jejunal ulcer, although not easy, is a very different problem. The predisposing if not the exciting cause of secondary ulceration is hyperacidity. It is, therefore, a complication which may be prevented by dietetic and medical treatment. It is met with rarely in private patients, and then usually in those who after the operation have lived "not wisely but too well."

Gastro-jejunostomy is the operation of choice for all cases of gastric ulcer except those in which there is a suspicion that the ulcer is a cancerous one. While there may be difference of opinion as regards the value of gastro-jejunostomy in the treatment of gastric ulcer, there can be no question that success can be attained by gastro-jejunostomy in over 90 per cent. of the cases of duodenal ulcer. Duodenectomy is a totally unnecessary operation; it is one of the most tedious operations in surgery.

Gastro-jejunostomy should be part of the treatment of a perforated gastric or duodenal ulcer. It is a life-saving measure. When performed in addition to suture of the perforation and drainage, convalescence is smoother and more uneventful and recovery is more speedy and more sure.

Gastro-jejunostomy should never be performed except when there exists an ulcer which can be seen and felt.

Gastro-jejunostomy is but an incident in the treatment of gastric and duodenal ulcers. A prolonged period of restricted diet is imperative, especially in cases in which there is

hyperacidity before operation. In all cases of hyperacidity increase in diet should be gradual and should be controlled by gastric analysis at regular intervals.

2. H. FINSTERER, Vienna

The results of routine gastro-enterostomy in gastric and duodenal ulceration are not satisfactory because: (1) the operation does not generally lead to the healing of the ulcer; (2) gastro-duodenal ulcers are not a very unusual complication of the operation; (3) hemorrhage from an unhealed ulcer is fairly frequent, and a perforation after gastro-enterostomy is not unknown. Since 1919 Finsterer has employed resection of the stomach in almost all cases which were not complicated with acute perforation; he has performed 593 resections for gastric and duodenal ulcers and only 5 gastro-enterostomies for duodenal ulcer.

Since 1919 in resections for gastric ulcers the mortality has become lowered to 4 per cent. (175 resections with 7 fatalities) and in duodenal ulcers to 2 per cent. (357 cases with 7 fatalities). Fatalities were due mostly to peritonitis.

Resection for duodenal ulcers shows better results than for gastric ulcers.

In gastric ulcers Finsterer performs resection in every case, even in old patients, because the danger of malignant degeneration is great, and it is almost impossible to recognize the degeneration during the operation.

In duodenal ulcers he prefers resection of the ulcer with a large part of the stomach. In non-resectable ulcers he performs the stomach resection for exclusion. As the permanent results depend on the extension of the resection, he removes the pylorus only if an absolutely safe closure of the duodenum can be expected. In old patients with a non-resectable duodenal ulcer he performs gastro-enterostomy.

In every resection the pylorus and two-thirds of the normal sized stomach are removed, and, as a rule, an end-to-end anastomosis is performed between the reduced opening of the stomach stump and the first jejunal loop. The Billroth 1 method shows a higher mortality and no better permanent results.

In gastro-jejunal ulcers it is necessary to perform a very extensive stomach resection and to avoid the Y-shaped anastomosis. In this way a good permanent result can be obtained after repeated operations.

CARBON DIOXIDE IN GAS AND OXYGEN ANESTHESIA. J. Ross Mackenzie, Scotland. *British Journal of Anesthesia*, October, 1926.

Re-breathing is an important factor in gas and oxygen anesthesia, and when regulated to suit the susceptibility of the individual patient, is of immense value. It: (*a*) saves the gases, (*b*) conserves the body heat, (*c*) retains the carbon dioxide in the expired air.

The advantages of a moderate increase (2–5 per cent) of carbon dioxide in the alveolar air are: *Operative*—1. It hastens the induction of anesthesia. 2. It counteracts the depression of the respiratory center which frequently follows preliminary morphia. 3. It maintains the acid-base balance of the blood. 4. It promotes ready separation of oxygen from the oxyhemoglobin to thet issues. 5. It improves enormously the general condition of the patient and preserves his vitality. 6. Indirectly through stimulation of the respiration, it has a tonic action upon the cardiac muscle and the large intrathoracic vessels. 7. It hastens the convalescence and complete recovery of the patient, by elimination of any toxic anesthetic agent from the tissues and blood, via the respiratory system. *Postoperative*—1. The best prophylactic against paresis or loss of tone in the muscular coat of the gastrointestinal tract is gas and oxygen with carbon dioxide, ether anesthesia. 2. It protects against postanesthetic respiratory complications. 3. It protects against post-operative thrombosis and embolism. There are considerable grounds for suggesting that the effects of deep ether anesthesia may take some part in the etiology of post-operative thrombosis and embolism. 4. The post-operative collapse which has long been recognized as surgical shock due to surgical trauma, is frequently due to the effects of a toxic anesthetic agent, oxygen starvation, and loss of carbon dioxide. The diminished blood alkaline reserve and the exhaustion of the cortical cells in the gray matter of the brain and medullary centers found in this condition, have been shown by Haldane and Mott to be due to lack of oxygen or carbon dioxide.

The pulse rate, blood pressure, general vitality, as well as the integrity of the medullary centers, can be restored by inhalation of oxygen with 5 per cent carbon dioxide.

De-etherization.—If ether has been used, it should be liminated from the blood and tissues before or after leaving the theatre. This may be carried out by means of the patient's own

carbon dioxide or by the method introduced by Yandell Henderson of giving carbon dioxide with oxygen.

The dangers of carbon dioxide are: 1. Convulsions. 2. Asphyxia from deficiency of oxygen. 3. Rupture of an alveolus from excessive tension in the pulmonary system. 4. Hypercapnia.

INEFFICIENCY OF MOST OF THE COMMONLY USED SKIN ANTISEPTICS. Martin B. Tinker and Henry B. Sutton, Ithaca, New York. *The Journal of the A. M. A.*, October 23, 1926.

The inefficient clinical results reported to Tinker and Sutton, by sixteen surgeons, all of whom made definite statements regarding infection, indicate, they believe, the need of a change of methods in the sterilization of the skin prior to the institution of operative procedures. In their experimental research on skin antisepsis, Tinker and Sutton made more than 1,500 cultures, tests about equally divided among eight antiseptics and eleven bacteria. The problem was approached on the basis of surface sterilization, disinfection of the deeper epidermis, penetration of skin antiseptics, efficiency of antiseptics in the presence of blood and the selective action of antiseptics. The substances used were iodine, mercuric chloride, trinitrophenol, mercurochrome, Harrington's solution, acriflavine, a mixture of neutral acriflavine and gentian violet, and lime and sod apaste. The latter was the only substance in which all varieties of bacteria used failed to grow. Acriflavine was second with only one growth (anthrax spores), and the acriflavine and gentian violet mixture third with three growths (anthrax spores, *b. pyocyaneus* and Welch bacillus). Harrington's solution and alcoholic iodine solution allowed five growths each, trinitrophenol and mercurochrome, six growths each. The authors believe that the inefficiency of these antiseptics should be considered as a possible cause of the troubles that surgeons have. Selective action of antiseptics must be considered. Because an antiseptic kills one variety of bacteria, even a resistant one, does not prove that it will kill all, even less resistant germs, unless all are tested. The aniline dyes seem to deserve further investigation and probably wider use on the basis of apparent germicidal power, penetration, low toxicity, harmlessness to instruments and supplies, and excellent outlining of the field.

FIBROSARCOMATOUS TUMORS OF THE SKIN OF THE TRUNK CHARACTERIZED BY ATTENUATED DERMAL SURFACES. Arthur E. Hertzler, Halstead, Kan. *Annals of Surgery*, October, 1926.

Certain tumors about the trunk are characterized by intimate attachment to the skin which gives them a peculiar and characteristic appearance. They are of slow growth, spindle-celled fibrosarcomas in structure and metastasize by way of the lymphatics.

A properly performed operation results in a permanent cure.

Their relation to the general group of sarcomas suggests that they are derived from adult tissue.

Several cases are illustrated.

THE TREATMENT OF HEMANGIOMA AT THE COLLIS P. HUNTINGTON MEMORIAL HOSPITAL. Grantley W. Taylor. *The Boston Medical and Surgical Journal*, October 14, 1926.

One hundred and ninety-three cases of hemangioma are described and analyzed. The results of surgical treatment are given. The technique of radium treatment and the results secured with it are discussed.

Surgical excision is the method of treatment to be preferred in small accessible hemangiomas when a scar will not be disfiguring.

Radium treatment is successful in telangiectatic angiomas and in small superficial lesions of skin or mucous membranes.

Radium treatment is moderately satisfactory in deep seated lesions.

Radium treatment is unsatisfactory in port wine marks and in superficial diffuse lesions.

Reactions with their sequelae of scars and telangiectases can largely be avoided by using silver screened radiation.

A NEW METHOD OF TREATMENT OF CHILBLAINS. Leonard J. C. Mitchell, Melbourne. *The Medical Journal of Australia*, October 2, 1926.

This treatment was suggested by Maclure's published results of the treatment of chronic ulcers and like conditions by the application of direct elastic pressure to the lesions through the medium of rubber sponges and toy balloons combined with free movement. The elastic pressure supplied by these various means acts in conjunction with muscular movement and

with the pulsation of the arteries as an ever present massuer which keeps the blood and lymph in these areas on the move and so the lesions are cleared up.

The surgical glove finger seemed the most likely article to serve. A rubber company made some pure gum rubber tubing of the weight of medium surgical gloves and varying diameters (fifteen, eighteen and twenty-one millimeters). This tubing can be made to order in a few days if the required diameters are given. From this tubing, which by its nature is not long lived, there are cut lengths of three-quarters to one inch as required and the circular band so obtained is stretched over the affected part at its greatest thickness. A sock is then put on and the band stays in place whether the sufferer is walking or at rest. The hands are best treated by the use of rubber gloves at night only, but these gloves must fit firmly. The relief from the itching and throbbing is instantaneous and after a few days the part is normal in appearance save for a little desquamation. The pressure must be firm, but not painful. The outer aspect of small toes at the metatarsal joint can be treated by the cuff of the rubber glove worn round the foot or by a thin piece of sponge rubber held firmly in place by a piece of sticking plaster. The ears present a difficulty not yet overcome, but a surf bathing cap might be worn at night. The breaking of the skin does not preclude the use of the method. Simply sterilize the area, dust with boracic powder, cover with a thin piece of lint and apply a band over this.

Postoperative Acetonuria. (*Postoperative Azetonurie*). Bruno Waller, Prague. *Zentralblatt für Gynaekologie*, September 25, 1926.

In an attempt to estimate the relative significance of the type of anesthesia, the nature of the preoperative treatment, etc., in the production of postoperative acidosis, the author studied 131 consecutive cases operated on at the gynecological clinic of the University of Prague. Eighty nine cases were laparotomies. Of these 48 were performed under lumbar anesthesia. Eighteen per cent showed acetone before operation and 89 per cent after operation and 62 per cent showed symptoms of acidosis. Thirty one cases were operated on under combined lumbar and ether anesthesia. Of these, 16 per cent had acetonuria before operation and 93 per cent after operation. Fifty five per cent presented symptoms of acidosis. Ten patients were operated with straight ether narcosis, 20 per cent had acetone in the urine before operation and 50 per cent after operation. Forty per cent developed an acidosis. Of 42 cases performed by the vaginal route, 17 were operated under lumbar anesthesia. Five per cent had acetonuria before and 88 per cent after operation. Seventy eight per cent developed acidosis. Of the 15 cases operated on under combined lumbar and ether anesthesia 6 per cent had acetonuria before and 100 per cent after operation, while only 26 per cent developed acidosis. Ten cases were given ether; 20 per cent showed acetone before, 70 per cent after operation and 20 per cent developed acidosis. The author reviews the various theories as to the causation of this postoperative acidosis and inclines to the view that shock and tissue trauma are of greater significance than lack of carbohydrates in the preoperative treatment. He calls attention to the fact that the cases anesthetized by the lumbar route showed a higher percentage of acidosis than those operated on with ether.

Treatment of Fractures of the Diaphysis of the Femur. (*Bebandlung der Frakturen der Femurdiaphyse*). R. Faltin, Helsingfors. *Acta Chirurgica Scandinavica*, Volume 60, Fasc. 6, 1926.

Realizing the difficulty of determining with any degree of scientific accuracy, the exact amount of weight necessary to secure adequate traction in the treatment of fractures of the femur, the author undertook experiments to establish the weight of the leg, the amount of friction and the muscular pull to be overcome. Legs amputated for various reasons were weighed before and after operation in an effort to estimate an average weight. Thereafter the author attempted to determine a method of estimating the weight of the leg in the patient with a fracture. The whole work is very interesting, and quite ingenious but gives no great promise of practical application at the present.

Treatment of Semilunar Dislocation (*Die Bebandlung der Mondbeinverrenkung*). Arnold Wittek, Graz. *Wiener klinische Wochenschrift*, September 16, 1926.

The author reports three cases of dislocation of the carpal semilunar bone. He comes to the conclusion that in the early cases, closed reduction is often attended with success. In cases in which several days have elapsed since the

injury, this method may be unsuccessful and then open reduction is the method of choice. In the old cases, reduction is usually without value and here extirpation of the bone is followed by good functional results.

Fracture of the Os Calcis. Nathaniel Allison, Boston. *Bulletin of the American College of Surgeons*, October, 1926.

Do [not temporize and procrastinate in fracture of the os calcis. Surgical intervention is demanded in the majority of cases. Determine the nature and extent of the injury by careful X-ray study. Devise a method which will replace the fragments and restore the bone to as near normal as possible. In injury to the subastragalar joint, arthrodesis of this joint holds the best promise of a useful foot.

Os Calcis Fractures: A New Method of Reduction. Maynard C. Harding, San Diego, Calif. *The Journal of Bone and Joint Surgery*, October, 1926.

There are three things to do to effect a reduction: The posterior end of the heel must be drawn down so that weight will be borne on the tuberosities and not on the fracture line. The anterior end of the heel must be pushed up to restore the arch. The broadening must be corrected. The knee is flexed over the end or side of the table.

The simplest and best way to bring down the posterior end of the heel is to seat a sharp claw retractor into the skin at the back of the heel by a light blow. This gives traction at the most advantageous point. It is never necessary to cut the Achilles' tendon. Three points of counter pressure must be provided. On a stool with a screw top is placed a triangular wooden wedge such as is used for club foot manipulations. The stool is screwed up until the wedge presses firmly into the sole of the foot at the calcaneocuboid joint. The fore foot is sharply bent down with one hand while the retractor is pulled down with the other and as much correction as desired is made.

A cabinet maker's D clamp is now applied to the sides of the os calcis, the pressure points being protected by felt or rubber. The clamp is screwed in slowly at first to overcome the swelling. This is continued until the width is the same as that of the opposite heel, tested by removing the clamp, and applying it alternately to the two. Pressure should be made at several points for a short time. It will be found that when the clamp is well screwed in it can be used as a Thomas wrench. When the fracture is well reduced, subastragaloid motion can be demonstrated to nearly normal range.

If desired the clamp and retractor can be left in place until the plaster has been applied, but this is not necessary. A light cast is put on from the toes to mid-thigh with the foot in extreme plantar flexion and the knee at one hundred and thirty-five degrees. This is to maintain relaxation of the Achilles' tendon. The plaster is pressed firmly against the sides of the heel while setting. The cast should be left on about three weeks. The patient can then bear a little weight on the ball of his foot if no pain results. Full weight-bearing should not be allowed under three months, and should be strictly supervised. A felt arch usually adds to the patient's comfort.

Actinomycosis of the Tongue: Report of Twelve Cases. Frederick A. Figi, Rochester, Minn. *The Surgical Clinics of North America*, October, 1926.

Four years ago New and Figi reported three personal cases of primary actinomycosis of the tongue, together with thirty-five cases collected from the literature. These three cases occurred in a group of sixty-six patients with actinomycosis of the head and neck. Nine more cases of primary actinomycosis of the tongue have since been recognized, making a total of twelve cases observed and treated at the Mayo Clinic. The number of cases in the head and neck has increased to approximately 225 during this time. The three earlier tongue cases were not in farmers, but all the nine later ones were.

Usually the patient notices a hard deep-seated nodule in the body of the tongue, which is at first painless and produces no discomfort aside from its presence. In the course of a few days to a week or two the nodule comes to lie directly under the mucous membrane of the tongue. It becomes softer, painful and tender. A pale yellowish area develops over the prominent portion and unless the nodule is excised or drained it ruptures and discharges foul pus. The pain then subsides but the process is repeated, rupture taking place again within a week or two. As this continues induration extends through the body of the tongue and floor of the mouth, and later an abscess usually points in the submental region.

If seen before the nodule broke down, it was widely excised and the tongue sutured. Then potassium was administered. If the nodule had softened and there was infiltration, simple drainage was established, the wound gently curetted and swabbed with tincture of iodin or cauterized lightly. Radium was applied below the jaw and potassium iodide was given in increasing doses.

Substernal Goiter. Frank H. Lahey, Boston. *The Journal of the A. M. A.*, October 16, 1926.

Lahey contends that any tendency for a goiter to become substernal is an indication for its removal. The ill effects of substernal goiter are primarily deviation, flattening, and narrowing of the trachea. The diagnosis by means of roentgen-ray and physical examination may be made with considerable certainty. Surgical removal may be accomplished in a great majority of cases when the substernal mass has passed downward behind the arch of the aorta, but an operative procedure of this magnitude would be unnecessary if the early adenomas and cysts were removed while still only tending to become intrathoracic. In an experience with more than 200 substernal goiters, Lahey has succeeded in accomplishing their removal without removal of the manubrium in all except two cases. The technical features of removal of substernal goiters are the prevention of hemorrhage and the protection of the pleura, thoracic duct, and recurrent laryngeal nerve, three structures which form the walls from which the intrathoracic mass must be separated, the prevention of tracheal collapse, and insufficient air intake during removal and the extrication of the mass. These steps may all be accomplished by gentle manipulations in the proper lines of cleavage and with the cooperation of an anesthetist experienced in the methods of aiding these patients in getting air during the time tracheal pressure is being made during the manipulative removal of the mass. This has been accomplished by a tight mask and the introduction of oxygen into the lungs by pressure.

Exophthalmic Goiter and Toxic Adenoma. Similarity of Response to Iodine. Allen Graham and Elliott C. Cutler, Cleveland, O. *Annals of Surgery*, October, 1926.

The authors dispute that there are two directly opposed types of toxic goiter (exophthalmic goiter and "toxic adenoma") in so far as any fundamental distinctions between the two supposed types are dependent upon opposite reactions to iodine.

Increased basal metabolic rate and other evidence of "thyrotoxicosis," together with hypertrophy and hyperplasia of the thyroid of any degree, they regard as sufficient indication for the administration of iodine, irrespective of the presence or absence of adenomata. They do not expect clinical improvement to follow the administration of iodine in any case in which the thyroid is normal or in a completely involuted or colloid state.

It is important to bear in mind that the quantity of iodine required and the number of days necessary to effect comparable reduction in the basal metabolic rate is far greater in cases of exophthalmic goiter than in cases of "toxic adenoma."

Probably the most important factor in determining the relative iodine tolerance of exophthalmic goiter and "toxic adenoma" is the difference in degree of glandular hypertrophy and hyperplasia of the thyroid in the two groups.

They recommend the administration of iodine as a measure preliminary to operation in all cases of toxic goiter whether the thyroid be adenomatous or non-adenomatous.

Plastic Surgery of the Breast. (*Über Mammaplastick*). G. Axhausen, Berlin. *Medizinische Klinik*, September 17, 1926.

Axhausen believes that unilateral virginal hypertrophy of the breast as well as the more common pendulous and hypertrophic breasts are proper indications for the performance of one or another of the types of suspension operation devised. In the operation suggested by Girard, the breast is approached from its posterior surface and suspended by its suspensory ligaments. Axhausen, however, prefers a modification of the procedure recommended by Lotsch. After circumcising the nipple, a large anterior skin flap is raised. The skin area to be removed is so planned that at the termination of the operation, the suture line will fall in the inframammary region. Thereupon, the excess of breast is removed, the nipple is transplanted into a newly formed aperture in the upper flap and the skin incisions are closed. In one of the cases reported, both the cosmetic and functional result were satisfactory 6 years after operation.

Gastric Function Following Operations on the Stomach. Stanley P. Reimann and L. Snellbaker, Philadelphia. *International Clinics, Vol. III, September, 1926.*

Patients with peptic ulcer have been examined by roentgenography and fractional test-meals at various intervals after operation.

Simple excision of the ulcer brings about no change in the physiology of the stomach. After "medical" treatment, the acidity was increased.

Pyloroplasty and gastro-enterostomy cause no marked lowering of the acid curves except when regurgitation occurs, which neutralizes the acidity to a certain extent. Pepsin values are usually normal; trypsin found in traces only as long as acid remains fairly high. The emptying time is not decreased.

Subtotal gastrectomy, where the antrum and pylorus are resected, consistently shows a marked lowering of the acidity; negative or low values for pepsin, some trypsin, especially when regurgitation takes place.

Regurgitation was always found to occur at some time during the two-hour test period, with gastro-enterostomy.

Duodenal Diverticulum. With Report of a Case Associated with Definite Symptoms. R. H. Kampmeier, Ann Arbor, Mich. *The American Journal of the Medical Sciences,* October, 1926.

A female, aged 36, had had more or less trouble with the stomach for twenty-four years. As a child she had repeated attacks of "catarrh of the stomach." For several years, she had pain two to four hours after meals, dull in character. It was confined to the epigastric region and did not radiate. Food, bicarbonate of soda, pressure, or lying on the face, relieved the pain. Five years ago there was hematemesis consisting of fresh blood. Fatigue aggravated the symptoms.

The above case was reported because of the rarity of diverticulum of the first portion of the duodenum. The pouch was found to be of comparatively large size, and contained all coats in its wall. The sac could be easily emptied by manipulation during the fluoroscopic examination. It was easily mobilized at operation, and was found to have only a few adhesions.

Diverticulosis of the duodenum has been found in about 1 per cent of cases in extensive series of barium-meal studies, occurring usually in patients past middle age. Only about 3 per cent of these occur in the first portion of the duodenum. Clinically, duodenal diverticulum cannot be diagnosed, being, without exception, found at roentgen ray examination.

Mechanical Factors in Chronic Appendicitis. Hall G. Holder, San Diego, Calif., and William C. Menninger, Topeka, Kan. *Annals of Surgery,* October, 1926.

The material presented in this paper is derived from a statistical and follow-up study of 208 cases of chronic appendicitis treated on the Second Surgical (Cornell) Division of Bellevue Hospital. Only those cases were included in which the data were reliable and complete as to operative findings, pathological report, and well-defined history.

A large per cent of the cases commonly diagnosed "chronic appenidcitis" are directly caused by a variety of mechanical factors acting on the appendix. These may be congenital or acquired, but either type may affect blood supply and motility leading to pathological changes and symptoms. Such cases might be more correctly termed "mechanical appendicitis."

Appendices which were microscopically normal presented some mechanical abnormality in 98 per cent of cases. Hence an inflammatory process is not a prerequisite to the clinical picture of "chronic appendicitis." When present, it is secondary to a previously abnormal mechanical status of the appendix.

Adhesions, either about the appendix, cecum, or colon are the most common mechanical abnormality, occurring in 73.5 per cent of the series. The frequent association with other mechanical factors is possibly secondary to the adhesions.

Kink of the appendix occurred most frequently in the normal appendix (35.3 per cent) and was commonly associated with the retrocecal position, adhesion and stricture formation.

Stricture formation occurred in nearly a third of all cases, most commonly with the atrophic type of appendix (37.5 per cent of all cases). In two-thirds (65.5 per cent) it was associated with adhesions.

The retrocecal position exercised a definite causative rôle in the production of symptoms. It occurred in 40 cases, in 18.7 per cent, of which the appendices were normal. In 17.5 per cent there were no other mechanical factors. Probably as the direct result of position and

the mechanical action of a dilated cecum, a kink occurred in 42.5 per cent of these cases.

The rôle of fecal stasis as a causative factor is probably underestimated. Fecaliths occurred in 31 cases in this series, in 28.8 per cent of which they alone were present to account for the symptoms. It is very likely that in many cases, the inflammatory process follows infection from fecal stasis in the appendix, although definite fecal concretions are not present. Frequent association of fecaliths with stricture formation (35.2 per cent of cases) and kink (25.6 per cent) is to be expected in view of the known method of their formation.

End-results show appendicectomy benefited these patients. In the group showing no pathological changes, with 98 per cent complicating mechanical factors, 22 cases are represented, 20, or 91 per cent, being benefited by removal of the appendix while 2, or 9 per cent, experienced no relief. Of the 105 cases in which there were accurate follow-up data, 97, or 92.4 per cent, were relieved by operation. Eight, or 7.6 per cent were not helped.

The Reduction of Colonic Intussusception by Air Inflation. Charles E. Farr, New York. *Annals of Surgery*, October, 1926.

There are several important advantages in the reduction by colonic pressure.

1. There is little or no shock.
2. The reduction is accomplished with great ease and rapidity, and with no danger whatever providing reasonable precautions are taken.
3. The force applied is much more effectual and much less likely to injure the already jeopardized bowel than manual reduction by laparotomy.

The child is prepared for laparotomy and the anesthetic is begun. The nozzle of a Davidson syringe is inserted in the rectum and as the child begins to relax the colon is slowly inflated with air. This has a triple advantage, first, that it brings out of the pelvis and the left half of the abdomen a tumor which at times might otherwise escape palpation; second, that the elastic pressure of air is very little likely to damage the bowel; third, it escapes on removal of the syringe. The bowel is almost instantly emptied of its contents of air and the distention of the colon is entirely relieved.

Careful palpation will reveal in many cases the remaining tumor in the right iliac fossa. This can sometimes be completely reduced with gentle pressure of the hands against the posterior abdominal wall. It would not be safe nor wise to consider the intussusception completely reduced unless a laparotomy is performed and the ileocecal region carefully investigated.

Spinal Anesthesia in Intussusception of Infants. Hamilton Bailey, England. *The Lancet*, September 25, 1926.

The advantages of spinal anesthesia in acute intestinal obstruction are now widely appreciated, for it is recognized that one of the greatest contraindications in all modern emergency surgery is an anaesthetic via the respiratory passages to a patient in the throes of fecal vomiting. Bailey would extend spinal anesthesia to intestinal obstruction during infancy. Within reasonable limits, when spinal anesthesia is being used, there is no particular necessity for speed. Refinements of technique are permissible in the majority of cases. Owing to the absolute muscular relaxation, the mass which constitutes the intussusception can usually be delivered through the wound into hot, saline-soaked gauze. This is always possible as soon as the splenic flexure has been passed. Extra-abdominal reduction, combined in stubborn cases with Daw's method of stretching the intussuscipiens has considerably minimized the necessity for resection and its concomitant risks. Under general anesthesia, and especially when gas and oxygen are being used, there is at least some difficulty in closing the abdominal wall in layers. The author reports an experience of 14 such operations, with one death. He used stovaine.

Uric Acid and Uratic Stones in the Kidney—Uric Acid Showers and Their Diagnosis. Edwin Beer, New York. *Surgery, Gynecology and Obstetrics*, October, 1926.

Many stones, if they are sufficiently large, even though composed almost exclusively of uric acid or urates, will throw a faint shadow in the urinary bladder with the Bucky diaphragm. When the stones are situated higher up in the ureter and kidney where they often are much smaller, even this improved technique fails to demonstrate the presence of the offending foreign body.

Beer reports six recent cases of uric acid calculus in the kidney in which the diagnosis was made by a combination of all the usual

methods of examination in addition to the demonstration of a filling defect in the pyelogram of the diseased kidney, and usually confirmed by obtaining a positive scratch mark on a wax whale-bone bougie passed into the offending organ.

Uric acid showers produce a clinical picture very similar to that produced by kidney stones —typical colics on one or both sides, usually with the presence of red blood cells in the urine. In these patients there may be no evidence of uric acid in the voided specimen at the time of its passage and microscopically only red blood cells or a few pus cells may be seen. On standing, however, in a preferably sterile test tube such urine will precipitate smaller or larger crystals of uric acid which adhere to the sides of the test tube, and when the tube is shaken the crystals will drip to the bottom and produce the typical brick dust appearance. The reason these crystals are thrown out in passing down the ureter is probably to be found in the fact that all the urine in these cases contain an excess of uric acid which is held in solution not by the water or fluid content of the kidney excretion but by the colloids which are present in the urine. When these colloids, for some reason, shake out the crystals a typical attack of renal colic takes place and the patient presents the picture of a typical kidney or ureter stone. The reason that the freshly voided specimen shows no evidence of the uric acid is that these colloids are in part reversible, which means that they reverse and again redissolve the uric acid which had been precipitated in the ureter, so that when the patient voids, the uric acid is in solution once more.

The microscopical or chemical tests are rarely necessary to identify these crystals after one is initiated. The blood chemistry so far as the uric acid content is concerned has been of little value as diagnostic evidence. Occasionally, though very rarely, on making a cystoscopic examination, after such an attack one sees the uric acid crystals in the floor of the bladder.

The change in these cases to a low protein diet will almost immediately control the symptoms.

Further Studies on the Transplantation of the Kidney. Carl S. Williamson, Rochester, Minn. *The Journal of Urology*, October, 1926.

An autogenous kidney transplant will maintain the life of the experimental animal for months after removal of the other normal kidney.

During the time that the autogenous kidney transplant is functioning the urinary constituents are essentially normal and the animal behaves and lives normally.

Failure in this type of experiment is due to hydronephrosis and infection.

Homogenous kidney transplants function as do the autogenous ones, but only for a period of days except in rare instances.

The blood urea of an animal with three functioning kidneys, two normal and one transplanted, is markedly reduced.

The location of the transplant does not materially lengthen the functional life or influence the terminal histologic picture.

The histologic picture in this type of experiment is that of acute atypical glomerular nephritis followed by general acute nephritis.

Infection as evidenced by the cytologic changes is not a factor in these experiments so long as good drainage and function are maintained.

If the transplanted kidney is allowed to remain in place after anuria develops there is a tendency for it to be replaced by fibrous tissue.

The failure of homogenous kidney transplants seems attributable to a biologic incompatibility between the donor and recipient.

The value of kidney transplantation as a clinical measure is questionable with our present knowledge, although under proper conditions it might be worthy of serious consideration.

The Abortive Treatment of Acute Gonorrheal Prostatic Abscess. Arthur J. Greenberger and Monroe E. Greenberger, New York City. *The Urologic and Cutaneous Review*, October, 1926.

Diathermy is the most satisfactory agent in the treatment of acute prostatis and the abortive treatment of acute prostatic abscess of gonorrheal origin. It relieves pain, decreases the prostatic mass and aids in complete resolution.

Predisposition toward Tumor Formation in the Ectopic Testicle. (*Die Prädisposition des ektopischen Hodens zur Tumorbildung*). S. Rubaschow, Minsk. *Wiener klinische Wochenschrift*, September, 1926.

In a series of 1178 cases of tumor of the testicle collected from the literature, Rubaschow found ectopic testicle in only 173, or

about 14 %. He shows further that ectopic testicle occurs in only about 0.13 % of patients. In other words the ectopic testicle shows a marked predilection toward tumor formation. He shows also that tumors of the testicle occur in about 0.04 per cent of all patients while tumors of ectopic testicle are found in about 0.17 %. Every combination of statistics tends to establish predisposition of the ectopic testicle toward tumor formation. In spite of this, because of the relative infrequence of tumors of the testicle in general, he advises against the prophylactic removal of the undescended organ. From the statistics quoted, it appears that testicles arrested in the inguinal canal are more liable to tumor formation than those retained within the abdominal cavity.

Ureteral Stricture. H. Fay Jones, Little Rock. *The Journal of the Arkansas Medical Society*, September, 1926.

Ureteral stricture is one of the most common lesions of the abdomino-pelvic cavity. Jones' experience supports Hunner who attributes ureteral stricture to focal infection, occurring most usually in the teeth, tonsils or sinuses.

Symptomatology varies from migraine or other forms of sick headache to almost every conceivable form of chronic gastro-intestinal symptoms, such as nausea, gas formation, diarrhea, colitis, all of which have defied all efforts at medical and surgical relief. The orthopedist sees certain cases of apparent lumbo-sacral or sacro-iliac disease or sciatica, in which all efforts to relieve are fruitless. In some of these, the symptoms are due to ureteral stricture and relief is obtained after proper treatment.

The surgeon and gynecologist are daily seeing patients who complain of vague backaches, bearing down sensation in the pelvis, ovarian neuralgia, pains in the hips and extending down the thighs. If these symptoms are associated with bladder disturbances, ureteral stricture should be carefully looked for.

There is an exaggeration of the symptoms from ureteral stricture during the menstrual period. The congestion causes a narrowing of the already strictured ureter.

Backache is the most common symptom of ureteral stricture.

Urinary frequency is more marked in some patients than in others. Usually this symptom is not one of the patient's complaints, unless the frequency is marked or nocturnal. Some patients complain of burning on urination. Cystitis, trigonitis, urethritis are probably contributing toward the incidence of the bladder symptoms, and it is probable that in most instances the three processes are from a common cause.

Kidney infection is very frequently associated with ureteral stricture, pyelitis and pyelonephrosis being the most common. Pyelonephritis is not an uncommon occurrence. Hydroureter and hydronephrosis occurred in about 40 per cent of Jones' cases.

The treatment consists in gradual dilatation of the stricture or strictures, with wax-bulbs or graduated olive bulbs as the dilators, the size varying from F-8 to F-18. Very often it is necessary at first to use a bougie before the bulb will start, especially in a ureter with a pinhole orifice.

Some Points in the Surgical Management of Seminal Vesiculitis. A. Reith Fraser, Aberdeen, and L. B. Goldschmidt, London. *The Lancet*, October 9, 1926.

From an excellent discussion of the subject three conclusions are drawn: (1) Conservative methods in the management of gonococcal vesiculitis still hold a premier place. (2) Vasotomy is a surgical procedure which shortens the duration of treatment without serious risk to the patient, and does not carry the tendency to sterility, spermatic fistula, and scrotal nodulation and infiltration which is associated with vasostomy. (3) In cases where direct attack on the vesicles is called for, vesiculectomy holds a distinct preference to vesiculotomy.

Endometriosis of the Sac of a Right Inguinal Hernia, Associated with a Pelvic Peritoneal Endometriosis and an Endometrial Cyst of the Ovary. John A. Sampson, Albany, N. Y. *American Journal of Obstetrics and Gynecology*, October, 1926.

A case is reported in great detail of pelvic peritoneal endometriosis associated with an endometrial cyst of the ovary and an inguinal hernia. Peritoneal lesions containing endometrial tissue were present in both the anterior and posterior culdesac and also in the walls of the hernia sac including its neck, the lumen of the latter having been occluded (or nearly so) by the endometriosis in this situation. Obser-

vations made at the operation and the laboratory study of the specimens removed indicate that the pelvic peritoneal lesions and those of the hernia sac had a common origin.

The clinical and pathologic study of pelvic peritoneal endometriosis convinces Sampson that it is usually due to the escape of menstrual blood into the peritoneal cavity with the subsequent local reaction. Menstrual blood at times passes into the peritoneal cavity as a back flow from the uterus through the tubes, from the tubal mucosa itself, from the perforation of an endometrial hematoma of the ovary and possibly from endometrial tissue on peritoneal surfaces. Menstrual blood, like other irritants, causes granulation and scar tissue, adhesions and peritoneal inclusions. In addition endometrial tissue is often found on the surface of or imbedded in these peritoneal lesions and must arise either from the implantation of fragments of uterine mucosa which are often present in menstrual blood, or else in some way the peritoneum is converted into endometrial tissue by the specific stimulation of some ingredient of this blood.

A Contribution to the Study of Endometriosis. Carl Henry Davis and Roland S. Cron, Milwaukee, Wis. *American Journal of Obstetrics and Gynecology*, October, 1926.

A study of their findings in 9 reported cases, and the literature on endometriosis has led Davis and Cron to agree with those who believe that at present no one theory will explain all. In one case there can be no question that the tissue removed from the uterosacral ligaments was transplanted uterine mucosa. The authors accept Sampson's observations as evidence that most endometriomata are transplants derived from uterine mucosa. In many instances, however, it may be impossible to prove that the primary endometrioma started from an embryonic inclusion or from transplanted uterine mucosa. The end-results may be the same.

The Significance of Uterine Mucosa in the Fallopian Tube, with a Discussion of the Origin of Aberrant Endometrium. Emil Novak, Baltimore. *American Journal of Obstetrics and Gynecology*, October, 1926.

Novak disputes Sampson's theory of pelvic endometriosis. His presentation is based upon the histologic study of hundreds of fallopian tubes, with particular reference to their contents. In seven tubes particles of uterine mucosa were demonstrated lying free in the lumen, and in one tube, which contained a pregnancy in its outer third, there was, between this point and the uterus, a mass of cells which resemble trophoblastic or possibly decidual cells.

None of the women from whom these endometrium-containing tubes were removed was menstruating, most of them being many days removed from this period. Five of the seven tubes containing endometrium were removed on the twenty-sixth, fourteenth, eighth, tenth, and ninth days of the cycle, respectively.

In at least five of the cases the particles of free endometrium are so large that it would seem almost impossible for them ever to have entered the tiny uterine orifice of the tube. The suggestion that they are probably moving toward rather than away from the uterus is strengthened by the finding of definite endometrial tissue in the ovary in at least two of the cases.

Thirteen observations in the course of operations upon women who were menstruating at the time and whose tubes were open failed to show regurgitation of menstrual blood in a single case. This experience corresponds to that of other surgeons. Histologic examination of tubes removed during menstruation characteristically shows little or no blood. No blood has apparently been observed in the pelvis in the thousands of women operated upon by thousands of surgeons immediately after menstruation.

If it takes the smaller ovum a number of days, at least, to pass down the tube, even with the current at its back, it would probably take much longer for tissue to pass upward against the stream, assuming that this were possible. Histologic studies show that the tissue thrown off at menstruation is dead or dying. Can such degenerative tissue thread itself into the tubal orifice, make its way upward against obstacles, and, after probably many days, still have sufficient vitality to grow where it falls? This would seem incredible.

If aberrant endometrium is not derived from the uterine mucosa by transportation through the tubes, what is its source? Novak offers evidence in support of the view that the explanation may perhaps best be sought by reference to the normal developmental history of the genital epithelia. All are derived from the celomic epithelium of the urogenital folds. Not only does this form the germinal epi-

thelium of the ovary and the follicular epithelium, but it also becomes invaginated to form the lining of the mülleran duct. The endometrium and the endosalpinx are therefore to be looked upon as mere modifications of the peritoneum. It is therefore not surprising that either peritoneum or germinal epithelium may at times show endometrial transformation.

THE CLINICAL SIGNIFICANCE OF X-RAY PELVIMETRY. Herbert Thoms, New Haven, Conn. *American Journal of Obstetrics and Gynecology*, October, 1926.

A method of x-ray pelvimetry has been presented by means of which the dimensions of the superior strait can be measured with remarkable accuracy. The method is applicable in any stage of pregnancy and does not require elaborate apparatus.

A technic has been described which makes it possible to obtain lateral views of the pelvis showing the contour of the sacrum and the relation of the presenting part to the superior strait. Attention is drawn to the value of such information in the diagnosis of the less severe grades of rachitic pelvic deformity.

The importance of the two methods as aids in the study of contractions of the pelvis is emphasized.

RUPTURED GRAAFIAN FOLLICLE OR CORPUS LUTEUM CYST SIMULATING ACUTE APPENDICITIS. Review of Cases in New York Hospital Since 1914. Elizabeth Brakeley and Charles E. Farr, New York City. *The American Journal of the Medical Sciences*, October, 1926.

One of the many mistakes made in the differential diagnosis of acute appendicitis is the finding on operation of a hemorrhage into the abdominal cavity from a ruptured Graafian follicle or corpus luteum cyst.

The authors review a series of 13 cases between the years 1914 and 1925. They illustrate the lack of any one distinguishing feature of cystoma of the ovary, and the difficulty of diagnosis from appendicitis, ruptured ectopic pregnancy or salpingitis.

They conclude: 1. Small hemorrhages into the corpus luteum, or follicular cysts, are quite frequent. Massive hemorrhages with intraperitoneal bleeding are much more rare.

2. The diagnosis is rather commonly overlooked and appendicitis is usually suspected.

3. With very rare exceptions operative treatment is not indicated.

4. The differential diagnosis is extremely difficult. The authors have found no pathognomonic sign nor symptom of hemorrhage into the Graafian follicle.

5. In case of doubt observation for a few hours is justifiable but as there is grave danger from delay in appendicitis, and very little danger from an unnecessary exploratory operation, it is wiser to operate if the symptoms do not subside.

LIGATION OF PELVIC VEINS IN THROMBOPHLEBITIS. R. R. Huggins, Pittsburgh, Pa. *American Journal of Obstetrics and Gynecology*, October, 1926.

This variety of infection should be recognized from the study of the clinical chart. The wide range of temperature, which may vary from below normal to 104 or 105, in the form of daily excursions; the pulse corresponding to the rise and fall of temperature; the presence of chills, especially during the early stages; a patient who in the first few days of her illness does not present the appearance of one acutely ill; the absence of positive blood cultures under ordinary methods. These are all signs which are most suggestive, and as a rule, are diagnostic of this particular form of infection. When local examination reveals only the presence of moderate enlargement on either side of the uterus and possibly only tenderness, strong corroboration is added.

In 1912, Huggins reported four cases where ligation of veins had been done in the treatment of puerperal thrombophlebitis.

He reports eight additional cases, making twelve in all. A careful review of these reports will show that all cases operated upon within a reasonable time after the onset of infection, with one exception, recovered. The fatal ones had all been sick for periods from five to eight weeks, and at the time of operation had other complications, such as pneumonia and infections of the urinary tract, and were all in poor condition. If these three hopeless cases were deducted, and in all fairness, this should be done, there would be but one death in nine cases.

Diagnosis is not difficult if a careful study of the patient's condition is made. Even when there may be doubt, an exploratory laparotomy in no way interferes with the progress of

the case. If a mistake is made, the patient will continue to live as she would otherwise. It is not unusual that a small abscess may be discovered either in the uterus or broad ligament, which if dealt with intelligently may alone justify this exploration.

The veins should be ligated through a transperitoneal incision. They need not be excised. The ligature should be placed distal to the point of infection if possible. It is probably true, however, that if this is impossible, good will be secured by a ligation of the vein somewhat short of the extreme extension of the infection, because when the blood current is interrupted the infection will cease to spread and will remain localized. Huggins has not hesitated to ligate both ovarian veins and in one instance the vena cava. There are few apparent symptoms from such a procedure except for a moderate degree of swelling of the legs, which disappears. This is also true of ligation of both the ovarian veins and the common iliacs. In the future, his procedure will be to ligate the common in preference to the internal iliac, as it is easier and can be done more quickly. The results in so far as untoward symptoms are concerned are no different.

The mortality of the entire series of twelve cases, four of which were reported in 1912, is 33⅓ per cent. The mortality under expectant treatment of this same class of cases is certainly not less than 66 per cent. Many men believe it is higher if the milder forms are eliminated. As stated above, if four cases all of which had been seriously ill for a period of more than four weeks were deducted, the apparent results would be even better. All four were really too sick for operation and its possible aid was given only after failure for many days of other methods of treatment. The eight cases that recovered were all operated much earlier, within a period of 19 days after the onset of symptoms and after the institution of all known methods of palliative treatment without improvement.

[All those who discussed this paper condemned the procedure, except Vineberg.]

THE VALUE OF CAUTERIZATION OF THE CERVIX BEFORE HYSTERECTOMY. B. Z. Cashman, Pittsburgh, Pa. *American Journal of Obstetrics and Gynecology*, October, 1926.

Subtotal hysterectomy is a less formidable operation than total hysterectomy, but has the disadvantage of leaving, too often, a diseased cervix. Cauterization of the cervix preliminary to subtotal hysterectomy destroys the infected cervical tissue and makes total hysterectomy unnecessary in benign conditions of the uterus.

THE TECHNIQUE OF WERTHEIM'S OPERATION FOR CARCINOMA OF THE UTERUS. (*Zur Technik der Wertheim'schen Krebsoperation*). Robert Asch, Breslau. *Zentralblatt für Gynaekologie*, September 25, 1926.

The author calls attention to several important points in the technique of the Wertheim operation. The two most vital parts of the procedure consist in preventing infection of the eritoneal cavity and in avoiding spreading of the disease. The first of these dangers is minimized by careful disinfection of the vagina before operation. For this purpose, the author suggests local removal of any ulcerations of the cervix followed by actual cauterization of the exposed areas. Thereupon the vagina is swabbed with 10% silver nitrate solution. The second of these dangers is avoided as far as possible by the use of the actual cautery in excising the tissue of the parametrium to be removed. In blocking out the tissues to be subsequently removed, Asch advises against the complete freeing of the ureters from their retroperitoneal tissues. The various steps of the operation as practised by the author are delineated in short outline.

ROENTGENOGRAPHY OF THE CAVITY OF THE UTERUS AND FALLOPIAN TUBES, WITH SPECIAL REFERENCE TO ITS VALUE IN CASES OF STERILITY. Robert L. McCready and Eric J. Ryan, New York City. *The American Journal of Roentgenology and Radium Therapy*, October, 1926.

The authors conclude:

1. Lipiodol is a very effective agent for roentgenography of the cavity of the uterus and the lumina of the fallopian tubes.

2. Roentgenography is a valuable addition to the diagnostic methods of the gynecologist.

3. Although interesting in other respects, the greatest practical value of the test is in determining the patency or position of occlusion of the fallopian tubes.

4. For obtaining accurate results with this test, stereo-roentgenography is essential and certain errors must be guarded against.

5. With the aid of this test, it is to be expected that much needed advances in the study of the relief of sterility due to occlusion of the fallopian tubes, will be made.

RADIUM NECROSIS OF BONE. D. B. Phemister, Chicago. *The Americal Journal of Roentgenology and Radium Therapy*, October, 1926.

Uninfected bone necrosis produced by the implantation of radium is disposed of differently according to whether or not it functions mechanically in the support of the part.

If an entire segment of the femur or humerus of a dog is killed and subsequently used in weight bearing, the dead bone will not be sequestrated, but will slowly undergo creeping substitution by ingrowing new bone.

If it is not used, as a result of non-union of a fracture through it, the necrotic bone will be sequestrated from the living bone and very slowly absorbed.

Because of the radium burn of the adjacent bone and soft parts, the rate of creeping substitution by new bone or of absorption is much slower than in the case of aseptic necrotic bone, the result of circulatory disturbance or of the application of chemicals.

Secondarily infected areas of bone killed by radium undergo sequestration, whether or not they function mechanically during the period of sequestration.

Bone killed by radium in the treatment of tumors is gradually replaced by new bone if it remains free from infection and functions in the support of the part.

When a small necrotic portion borders on an articular surface, it does not become detached and go free into the joint as a joint mouse.

SIALOGRAPHY. (*La Sialographie*). Jacobovici, Poplitza et Albu, Cluj. *La Presse Mèdicale*, September 18, 1926.

The roentgen examination of the salivary ducts of the parotid gland is valuable in the differentiation between diseases of the neighboring tissues and of the gland itself. It has also a value in studying the anatomic variations of the ductal system and is of some interest in the study of the normal physiology of the gland. The authors advise the injection of a 20 % solution of iodipin by means of a simple syringe. The normal duct system will accomodate about 4 cc. of this solution without any untoward effects. When the duct is full, the patient will complain of a sensation of pain in the region of the ear on the same side. As soon as the injection is completed, the patient is x-rayed in the ventral position with the forehead against the plate.

SUPPLEMENTARY ABSTRACTS ON ROENTGENOGRAPHY AND RADIUM THERAPY

CAMP, JOHN D., REEVES, R. J., and FIELD, HENRY, JR. Experiences with cholecystography. *Boston M. & S. J.*, May 27, 1926, cxciv, 976–980.

A review is presented of the experience in 475 cases referred to the roentgen-ray department of the Massachusetts General Hospital for a study of the gall-bladder by the Graham method. Both the intravenous and oral methods were used.

Sodium tetrabromphenolphthalein when given intravenously produced such a reaction in the patient that its use in this manner was not considered safe. The tetraiodophenolphthalein salt was given intravenously without a severe reaction in 72 cases although about one-third of these experienced some nausea and vomiting. The tetraiodophenolphthalein sodium salt in plain gelatine capsules given by mouth was employed in 334 cases of whom 67 per cent experienced some nausea and 31 per cent complained of varying degrees of vomiting. The oral administration of the tetraiodo sodium salt in coated or hardened capsules or pills did not give consistent results. Many of these capsules failed to dissolve and the resulting shadows were not reliable. Moreover their use did not eliminate nausea and vomiting.

In the interpretation of the roentgenographic shadows the examination was considered negative when a shadow of homogeneous density comparable to the established normal appeared at the various accepted intervals and diminished in density following the ingestion of a meal rich in fats. Although the gross variations in density of the shadow are not difficult to appreciate, the less marked variations must be interpreted with caution as one must take into consideration the size of the patient as regards the amount of soft tissue superimposed upon the gall-bladder, the quality of the negative, the amount of vomiting produced with probable loss of a certain portion of the dye, and, if coated capsules or pills have been used, the number that have remained undissolved. Variations in size and delay in filling and emptying of the gall-bladder are probably of some pathologic significance, but they cannot as yet be accepted as reliable indications of pathology. Their value still remains to be established by further experience.

Shadows of diminished density due to superimposed gas in the bowel may be difficult to different ate from negative stone shadows. As a rule the gas shadows will change in shape or position, or they may be changed in relation to the gall-bladder by varying the tilt of the roentgen-ray tube. If there is still doubt as to the nature of the shadow a film made following an enema will usually show considerable difference in the appearance of the colonic shadows. Additional sources of error may be found in negatives of poor photographic quality. A small amount of motion may obscure the outline of the dye-filled gall-bladder and suggest that it has not been filled; or a negative stone may be obscured by motion not sufficient to obscure the outline of the dye-filled organ. The failure to include the gall-bladder in the area exposed may provoke the erroneous opinion that it has not been filled.

Dandy, Walter E. Diagnosis and treatment of brain tumors. *Deutsche med. Wchnschr.*, Apr. 9, 1926, lii, 638–639.

Cerebral pneumography is of importance in the localization of brain tumors where other well-known clinical methods fail, and this covers about one-third of all cases of brain tumor. The procedure is valuable also for demonstrating local dilatations of the ventricles and subarachnoid spaces resulting from brain atrophy due to trauma, injections, and vascular clogging. A knowledge of the ventricular system is therefore the key to the secrets of the cranial labyrinth.

The cerebral ventricles can be reached either by direct puncture of the lateral ventricles or by way of the spinal canal. The author prefers the direct method of approach, because one is always certain of filling the ventricles no matter where the ventricular block may be; and the air employed in pneumography may be easily removed. Moreover, puncture of a dilated ventricle is the best method for quickly and safely reducing intracranial pressure. On the other hand, lumbar punctures are dangerous in cases of brain tumor, and this danger is increased when air is injected through the lumbar puncture. The great danger of the air injections lies in the resulting increase in intracranial pressure. The air causes an irritation and stimulates a further production of cerebrospinal fluid. Since most tumors block many portions of the ventricular system, the increased fluid cannot be taken up in the ventricles and is thus prevented from reaching the subarachnoid spaces where it can be absorbed. These dangers are avoided by direct puncture of the ventricles, a procedure which permits the removal of both air and fluid.

Eggers, Carl. Lung abscess complicated and hidden by empyema. *Arch. Surg.*, January, 1926, xii (Part ii), 338–384.

Lung abscess perforating into the pleura seems to be a fairly frequent occurrence and augers rather well for the patient so far as cure of the abscess is concerned. Small lung abscesses are probably common, and those situated peripherally may rupture into the pleura. It is impossible to tell how frequently they occur, because they undergo absorption and disappear entirely, thus leaving no indication that the empyema had started in that way. Although there is laboratory evidence in support, there is little clinical evidence that subpleural abscesses play a rôle in the production of empyema.

That larger abscesses have ruptured is easy to demonstrate, and such abscesses can be visualized roentgenographically after evacuation of the empyema. Such clinical lung abscesses complicated by empyema may follow a pneumonia or any other of the well-known etiologic factors. It does not appear that the etiology plays any rôle in the position of the abscess, whether near the periphery or more centrally located, or whether it is likely to rupture or not. Reports are given of 10 cases. In only 3, or possibly 4 of the patients was there a fairly definite history of a preceding pneumonia. In 3 or possibly 4 the onset was either sudden or gradual but without definite antecedent pneumonia, injury, infection or operation about the mouth or throat. In one patient it followed a septic abortion and in only 2 was it a sequel to operation, and therefore probably due to aspiration of septic material.

Many cases with a peripheral abscess and no bronchial communication may never be recognized as lung abscess. It is important in all these cases to have free thoracic drainage; and it must also be possible for the lung abscess to drain freely into the pleura. If there is any obstruction there will be a damming back of pus with constant reinfection and a long convalescence. In most cases there is some bronchial communication and the patient expectorates pus. As a result the tension in the abscess is not great, and consequently the pleural perforation is not large. There is a gradual leakage with the production of an encapsulated empyema. If the bronchial communication is large, the opening in the pleura may be correspondingly small. If the rupture into the pleura is large allowing free exit of pus in that direction there will be little or no pus expectorated. To the latter group belong chiefly the peripheral abscesses.

Some of the variations in this condition are

illustrated in the 10 cases that are described and illustrated. It is worthy of note that all of the patients recovered. Apparently, rupture of the lung abscess into the pleura may be considered a favorable circumstance. This is especially true of the abscesses that perforate slowly and give the overlying parietal pleura an opportunity to become adherent and thus to limit the extent of the exudate. If the abscess communicates with a bronchus, a pyopneumothorax results with collapse of the lung, which is a more serious condition and requires a long convalescence. However, these bronchial fistulas are usually obliterated spontaneously and do not require secondary operation. Adequate drainage of the thorax and at times mobilization of the lungs are required to bring about healing.

Hoesch, K. Modern gall-bladder diagnosis. *München. med. Wchnschr.*, Feb. 26, 1926, lxxiii, 369–372.

The newer procedures in the clinical diagnosis of gall-bladder disease are discussed, including the Graham and Cole roentgenographic method for visualization.

It is considered doubtful whether the tetraiodophenolphthalein or tetrabromphenolphthalein is always excreted through the liver exclusively. In some cases the author was able to demonstrate the excretion of iodine in the urine also.

The method of intravenous injection was employed by the author and severe symptoms were never observed when the dye solution was injected very slowly (in fifteen or twenty minutes), and was followed by an injection of saline. Hypophysin was previously administered in order to secure emptying of the gall-bladder. In only one case was there a pronounced attack of coughing due to vagal stimulation in a case of acute cholecystitis. The intravenous method of administration is preferred to the administration by mouth or per rectum.

The most striking thing observed in the roentgenograms is the remarkably variable position and degree of filling to be found in the gall-bladder. Maximum filling was found twelve to sixteen hours after injection. A dorsoventral roentgenogram with the patient prone on the Bucky diaphragm shows the gall-bladder fairly close to the spinal column at the level of the 1st, 2d or 3d lumbar vertebrae and of an elongated pear shape. In general, the roentgenological topography agrees but little with the well-known anatomical topography of the gall-bladder. The position of the organ with respect to the neighboring intestinal sections is of interest. The duodenum travels circularly above the gall-bladder along the surface of the liver and then diagonally in front of the lower edge of the gall-bladder. As stated, the bladder may assume a variety of shapes. The picture of hypertonic gall-bladder was observed regularly amongst vagotonics (especially those with gastroduodenal ulcers), and the atonicamongst those with enteroptosis. In pericholecystitis the gall-bladder is able to fill with the contrast material despite very unusual position and shape.

Experience has shown that completely normal pictures may be observed in clinically definite cases of cholecystitis. This of course does not diminish the value of the method since the clinical findings are of primary importance. It has been stated by Pribram that if the gall-bladder cannot be visualized in sixteen to thirty hours one can conclude with great certainty that there is an obstruction in the cystic duct, in the neck of the bladder, or that the bladder is filled with stones. The author's experience indicates that the above statement is not absolutely true. The interpretation of obstruction, etc., is supported only when in addition to a negative cholecystography there has also been one or two negative tests of the pituitrin reflex.

The Graham method also permits the direct observation of the reflex mechanism of the gall-bladder. The administration of hypophysin caused a pronounced but partial contraction of the gall-bladder. The effects of injection of adrenalin, atropin, and pilocarpin were also observed.

Keefe, John W. Diverticulitis of the sigmoid or pelvic colon with sigmoido-vesical fistula. *Boston M. & S. J.*, Apr. 1, 1926, cxciv, 577–586.

Carcinomatous, tuberculous, syphilitic disease and pelvic inflammatory conditions in women should be distinguished from diverticulitis. Cystoscopy may sometimes, though not always, disclose a sigmoido-vesical fistula. If the presence of infection is established a too ambitious surgical intervention is to be avoided. As in other surgical conditions, so also here the least radical surgical procedure consistent with the removal of the disease will conserve the greatest number of lives.

The symptoms and sequelæ of diverticulitis resemble those of appendicitis with local manifestations in the left iliac region. The roentgenological examination is of the utmost importance in the diagnosis of diverticula.

It is desirable to make use of stereoscopic roentgenograms as well as of screen and simple plate examinations at various angles. A liquid enema may be found of more value than the opaque meal. Should a diverticulum be filled

with a fecal concretion or the inlet to the diverticulum be small, it may be impossible for the opaque fluid to enter the pouch. The roentgenologic examination is of greatest assistance in differentiating diverticulitis from malignancy, and one should bear in mind that both of these conditions may be present in the same patient. When diverticula are present the findings after administration of an opaque meal show small, rounded shadows outside of the colon. They can be seen to best advantage on the second or third day following the barium meal. Some show best when the plate is taken following a barium enema.

About 60 per cent of cases of diverticula are followed by infection and serious sequelæ. The treatment consists in a diet that leaves but little residue, free bowel evacuations aided by colonic irrigations and these failing, by surgical intervention. Abscesses should be incised and drained and if the diverticulum can be readily found, it should be removed and the opening in the colon closed with sutures.

Brief reports are given of 3 cases of diverticulitis of the colon, one of which was complicated by a sigmoido-vesical fistula.

Lenk, Robert. The differential diagnosis between tumor and tuberculosis of the lung. *Klin. Wchnschr.*, Apr. 30, 1926, v, 800–805.

The generally accepted triad of symptoms diagnostic of tumor of the lung: unilateral localization, homogeneity, and sharp delimitation of the shadow, is equivocal. These symptoms merely represent rough anatomical or physical conditions which may not apply always to tumors and which may frequently occur in other diseases. The most important characteristics of malignant tumor, namely, its aggressiveness, and its destructive growth are not represented in the above symptoms.

The effect of a probatory irradiation together with local and general changes as interpreted in the light of radiation biology may give an indication as to the nature of the pathologic process. The filling of the bronchi with contrast material has been found by the author to give very distinctive and diagnostic pictures. It is true, of course, that in very many cases the clinical examination alone will yield a correct diagnosis, but there are other cases in which the true condition is not discovered until autopsy.

Lewin, Philip. Calcaneal spurs. *Arch. Surg.*, January, 1926, xii (Part 1), 117–123.

The literature on the subject of calcaneal spurs, which is not extensive, is reviewed, and 2 unusual cases are reported.

The customary teaching that all calcaneal spurs are of gonorrheal origin is grossly wrong. The various etiologic factors are (1) focal infections; (2) metabolic disturbances; (3) trauma; (4) static conditions (flat foot), and (5) a short plantar fascia pulling on its attachment to the os calcis.

The symptoms are pain, tenderness, swelling and limp. The onset is usually gradual except when due to an infection. The pain and tenderness are usually in the internal lateral border of the os calcis, or at the attachment of the plantar fascia. The roentgenogram may or may not reveal a bony spur, depending on the duration of the pathologic condition and the density of the spur. Many very painful heels are seen, the roentgenograms of which reveal no spurs. The diagnosis is usually easy and the differential diagnosis rests between osteoma, flat foot and arthritis. The prognosis for complete relief is good if the spur is the only cause of trouble. Most patients can be made comfortable without operation, others are not cured by operation. There may be recurrence of symptoms and spur formation in the same or the opposite foot. It is highly inadvisable to remove calcaneal spurs unless they are the cause of the patient's complaint or unless one feels that removing the spur will give the patient a comfortable foot. The situation is analogous to operating on hallux valgus; after a perfect operation the patient may still have painful feet due to conditions outside the big toe area, such as metatarsalgia.

In the first case reported, which occurred in a boy aged nine, the roentgenogram revealed a definite bony tumor. This mass was removed by chisel and mallet, and the patient made a perfect recovery. The diagnosis was osteoma of the os calcis. The second case occurred in a boy aged thirteen who presented marked multiple cartilaginous exostoses which were clearly distinguishable in the roentgenogram. No operation was performed.

Meyer, Willy. Postoperative gangrene of lung with encysted empyema. *Arch. Surg.*, January, 1926, xii (Part 11), 329–337.

The roentgenogram, which in combination with bronchoscopy is usually relied on to determine the true character and localization of pulmonary affections, is of little assistance in the differential diagnosis between abscess of the lung, on the one hand, and pneumonia due to aspiration (gangrene) with encysted perforated empyema, on the other. In both, the roentgenogram shows a distinct cavity with fluid level which is not characteristic of either of them. But carefully analysis of the clinical symptoms, with the roentgenogram in hand, can establish the refined diagnosis.

Distinct localized dullness on percussion, absence of amphoric breathing and particularly a rare cough with scanty foul sputum, in spite of the large cavity with fluid level as shown by roentgen-ray examination is the principal symptom-complex. It speaks definitely for localized septic pneumonia due to aspiration (gangrene) with encysted empyema, in which the perforation and communication with the bronchial tree has occurred in its upper portion.

After signs of aspiration with its sequelae have developed in a hitherto healthy individual, bronchoscopy with aspiration as soon as possible, irrespective of high fever, and repeated if necessary, will often mitigate or even abort a threatening serious condition. If a complicating encysted empyema has been definitely established operation from without is the only procedure indicated. Such a condition was found in a man aged fifty-nine, and the case is described in detail.

O'Brien, Frederick W. Cholecystography. *Boston M. & S. J.*, March 25, 1926, cxciv, 522–529.

Thus far cholecystography has helped us get rid of some notions, clarify others and awaken the hope of learning much more about the gall-bladder. Our knowledge to date permits us to say that a gall-bladder that fills with the dye and empties promptly on response to a fat meal is within normal limits; and that one which does not fill with the dye is pathological, bearing in mind the reservation that goes with negative tests, especially if the dye is administered orally.

For some years now roentgenologists have not hesitated to talk about the direct visualization of the gall-bladder. It was not always clear whether the shadow pointed out was a pole of a kidney, a small lobe of the liver, a portion of the duodenum, the antrum of the stomach or the gall-bladder. Cholecystography definitely locates the gall-bladder and differentiates it from a kidney, the duodenum, the liver, the appendix, the ovary and other localized sites of pain in the abdomen.

Nothing since the use of the opaque meal in the study of the gastrointestinal tract has been comparable to the discovery of this new method.

Reinecke, R. An unusually large esophageal diverticulum adherent to the pleura, and its operative treatment. *Fortschr. a. d. Geb. d. Röntgenstrahlen*, 1925, xxxiii, 949–953.

A report is given of a case occurring in a man aged forty-four, who had complained since 1916 of difficulties in swallowing. An esophageal diverticulum was discovered roentgenoscopically in 1918. Repeated observations disclosed an increase in the size of the diverticulum, and by 1923 it became impossible to admit any food to the stomach.

Esophagoscopy disclosed a dilatation 8 cm. in diameter. The roentgen examination showed in the region of the jugulum a sharply outlined shadow about the size of an infant's head located 4 cm. below the clavicles. This shadow moved very little during swallowing. Introduction of a contrast paste filled the lowest part of this shadow, but none of it traversed the portion of the esophagus lying below. About 0.5 cm. outside of the sharply outlined shadow of the contrast material there was seen a second shadow line which could be followed around the mass of contrast material, and extended upwards. The diagnosis was large esophageal diverticulum with very thick wall. The question of substernal struma was answered in the negative because roentgenoscopy in the various directions showed the substernal space to be free. There was evidence that the diverticulum was adherent at its lower end. The diverticulum had grown to a maximum transverse diameter of 12 cm., and total height of 16 cm. at the time of operation.

This unusually large, thick-walled diverticulum with the main enlargement located unusually deep in the chest, and presumably having pleural adhesions, demanded an operative procedure different from the customary one for smaller dilatations. The patient insisted on some operative procedure that would permit extirpation at a single operation. His condition was very poor but operation was attempted, and he died. The extirpated diverticulum had an extraordinarily tough wall of leathery consistency. The histologic examination of the tissue disclosed only fibrous tissue with entire loss of musculature.

Sigl, August. Pyelography with iodipin. *München. med. Wchnschr.*, Apr. 9, 1926, lxxiii, 617–618.

The author has employed iodipin as a contrast material in the roentgenoscopic demonstration of the kidney pelvis, the oil being used in 40 per cent concentration. Its use was not accompanied by symptoms of pain or intolerance in the patients. Ordinarily, the material is quickly eliminated, and in all cases but one there were no residues of the oil visible roentgenoscopically after twelve hours. The one exception was in a case of hydronephrosis with kinking of the ureter, the latter condition preventing free elimination of the oil.

The only disadvantage in the 40 per cent iodipin is its rather high viscosity which

renders difficult the introduction of the oil through narrow ureteral catheters. This viscosity also renders the outflow slow. The author has therefore gone over to the use of a 20 per cent iodipin, and found it completely satisfactory for pyelographic purposes. The injection syringe is kept in place while the pyelogram is being taken and when the latter is completed, the material remaining in the catheter is sucked back.

Torek, Franz. Actinomycosis of the lungs and chest. *Arch. Surg.*, January, 1926, xii (Part II), 385–391.

A report is given of a case occurring in a man aged forty-two. The diagnosis of the condition was easy to make because of the external thoracic involvement with its well-developed, old, glistening yellowish brown actinomyces granules. When these are younger, they are soft, gray, transparent and not easily detected. Without the presence of this external involvement the diagnosis would have been by no means easy.

The roentgen-ray examination did not help in the diagnosis. The first roentgenogram of the lung suggested the presence of a tumor and a second was considered suggestive of chronic pulmonary tuberculosis.

Wierig, Alfons. On the differential diagnosis of duodenal diverticulosis. *Klin. Wchnschr.*, March 26, 1926, v, 562–563.

A case is described in a man aged sixty-two, who because of suspicion of advanced gastric carcinoma was subjected to a roentgen examination. In the middle of the stomach on the side of the greater curvature there was an irregular projection about the size of an apple, alongside of which the descending colon filled with contrast material (the diagnosis of a direct gastrocolonic fistula through an ulcerated carcinoma was confirmed in a control examination with contrast enema). The lower portion of the stomach widened out very much during the course of the examination. The pylorus remained open all the time, and the contrast material entered the duodenum in increasing quantity. The whole duodenum up to the duodenojejunal flexure widened out and remained filled up. This gave the impression of the existence of a stenosis at the flexure in the region of the tumor. In the region of the descending section of the duodenum there were observed two hernia-like, rounded shadows of the size of cherries. Repeated examinations showed them to be in the same position and of the same shape. After emptying of the duodenum they disappeared. They also showed a slight mobility toward the abdominal wall. No peristalsis could be observed and pressure sensitiveness was absent.

This finding made the diagnosis of pulsion diverticulum probable although the diagnostic difficulties were great and all the criteria of Forssell were not satisfied. The whole roentgen finding, especially the position, the plurality, and their mobility indicated "pulsion diverticulum." At autopsy, however, the duodenum showed no sign of diverticulosis despite the most careful search. It was found that the upper portions of the small intestine were stuck together by inflammatory adhesions, the mesentery was shortened, thickened and shot through with grayish-white tumor masses, gland metastases.

The shadows thought to be diverticula were probably portions of the jejunum filled with contrast material, which because of adhesions could change their position with respect to the duodenum only very slightly. The rapid filling of the intestine caused the jejunum shadows to appear always in the same position with respect to the duodenum.

Willan, R. J. Diagnosis by pyelography. *Brit. M. J.*, March 6, 1926, i, 409–410.

It is now possible to diagnose by pyelography conditions such as: pyelitis, pyelonephritis, hydronephrosis, renal ptosis, tuberculosis and growth, together with congenital cystic kidneys and ureteral stricture. It is also valuable as a means of diagnosis in essential hematuria, in renal and ureteral calculus, and in cases of obscure extra-urinary tumor or where unusual shadows are seen on roentgenography.

A good roentgen-ray outfit is indispensable, and the best results are obtained when the combined measures of ureter catheterization followed by roentgenography can be carried out without moving the patient. The contrast medium employed by the author is a 13.5 per cent solution of sodium iodide, which has never caused inconvenience either local or general to the patient. Moreover, the solution is easily sterilized. The introduction of the sterilized solution must be done very carefully in order to avoid over-distention which may produce renal colic. At the same time sufficient distention must be secured because an incompletely filled pelvis or calyces may give a misleading picture. Wherever possible the ureters should be catheterized without a general anesthetic; a pyelogram should never be made when the patient is unconscious, for to do so invites disaster from rupturing the renal pelvis by overdistention.

To interpret a pyelogram, the gross elementary anatomy of the kidney must be borne in mind, namely, that the kidney comprises solid and hollow portions. The normal position

of the kidney must be kept in mind. Roughly this corresponds to the last dorsal and upper three lumbar vertebræ. The size of the kidney can be approximately gauged by building an imaginary solid portion around the renal pelvis and calyces, as demonstrated in the pyelogram. The interpretation of the pyelogram depends primarily on understanding (1) that the solid medullary apex projects into the outer end of the tube-shaped calyx, and (2) that if this tube-shaped calyx is distended with fluid such fluid surrounds the solid medullary apex which is projecting into that calyx. Extraureteral shadows can be differentiated by ureterography during pyelography.

Illustrative cases of the following conditions are cited: pyelonephritis, hydronephrosis, congenital cystic kidney, tuberculous kidney, malignant growth, abdominal tumor, and ureteral kink.

Brunn, Harold. Primary carcinoma of the lung. *Arch. Surg.*, January, 1926, xii (Part 11), 406–439.

The difficulties in the treatment of primary carcinoma of the lung include not only the surgical problems involved but also the peculiar and vicious characteristics of the disease and the difficulty in diagnosis while in the operable stage. The clinical symptoms are widely variable. The disease may be so fulminating and rapid in its course that death comes in a few weeks; and on the other hand, extensive metastases may have occurred before the lung phenomena have expressed themselves in diagnosable form.

Since deep roentgen-ray and radium therapy have not proved at all successful in the treatment of primary carcinoma of the lung, the one hope for amelioration of symptoms and prolongation of life, or perhaps cure, depends for the present on surgery. Surgery may be favorable in the cases diagnosed early before metastases have occurred or complications resulted. Tumors located in the periphery or small branches of the bronchi afford some chance for successful operative intervention. This is especially true of carcinomas in the lower lobe. Tumors lying in close proximity to the hilum are difficult to handle by resection, but they may be held in check at least by cauterization. The author believes that cautery affords the best means for removal of malignant growths in the lung.

A report is given of 2 cases in which operation was performed. In neither of the cases was the condition diagnosed sufficiently early to make probable a permanent cure.

In the diagnosis of primary carcinoma of the lung the clinical history is of the utmost importance. This, combined with the physical examination, the examination of the effusion and the sputum, and the roentgen-ray and bronchoscopic examinations must all be correlated in order to arrive at an early diagnosis. In a patient of the carcinoma age showing no symptoms of cardiac, renal or arterial disease, sudden appearance of cough and shortness of breath should suggest pulmonary neoplasm. There are two symptoms in carcinoma which are rarely seen in early tuberculosis. These are pain in the chest and dyspnea. In the roentgenologic diagnosis we have to consider benign tumors which are rare, generally clear cut in outline and which fail to increase in size after repeated examinations. The malignant tumors may be classified roentgenologically as (1) hilar, infiltrating and bronchial; (2) lobar, nodular and miliary, and (3) mixed. Bronchoscopy is a valuable adjunct in diagnosis. Early bronchial tumors have been diagnosed by means of the bronchoscope even before they were demonstrable roentgenographically.

The literature on the subject of primary carcinoma of the lung is reviewed.

Cunningham, John H., and Graves, Roger C. Tumors of the bladder. *Boston M. & S. J.*, Apr. 1, 1926, cxciv, 573–577.

The treatment of malignant disease of the bladder is one of the biggest unsettled problems in urology. The great uncertainty in the reported unfavorable results lies in the fact that the individual tumor is often visible only through the cystoscope; and after treatment by radium, roentgen rays or diathermy, it is so altered that a true pathological diagnosis cannot be made. Indeed in many recorded cases a specimen for histological examination was not taken. A plea is made for a uniform histological classification, so that one may properly judge the true status of variable malignancy and thus be able to evaluate results of the various therapeutic measures now in use.

When the tumor is deeply infiltrating, the results obtained by whatever method of treatment have been far from satisfactory. If the tumor is not extensive, and resection can be carried out leaving a safe margin of healthy tissue, with or without the necessity of ureter transplantation, we may occasionally produce a cure. The authors believe that if resection is to be carried out the tumor area should first be destroyed by heat. Experience has shown that this procedure involves no greater risk of recurrence than any other.

In the group of cases which may be termed inoperable, where radium or diathermy or

both combined have been employed, the results obtained have been almost uniformly unsatisfactory, and the few favorable results that have been obtained are believed to be due to a relatively low form of malignancy. In employing diathermy, some means is necessary to determine what is going on during the operation; and a device has been constructed by Dr. Graves and Dr. Bovie which permits the complete destruction of a desired area without harm to adjacent structures which should be preserved. This device permits the application of so-called "controlled" diathermy.

The device consists essentially of the multiple system of thermocouples. Each couple lies in the tip of an intravenous needle, and the whole system communicates with a central switch board which in turn communicates with the recording meter. These thermal junctions give an accurate measure of the temperature of the tissues in which they are buried. This information permits the operator to determine when complete destruction of the tumor has been obtained, and also when adjoining tissues approach a temperature near the danger point.

Stone, William S. Radium therapy in carcinoma of the esophagus. *Arch. Surg.*, January, 1926, xii (Part II), 230–231.

The author has had an experience of eight years in the radium treatment of cancer of the esophagus and cardia. One important thing that has been learned is that gastrostomy is much more of a surgical palliative procedure than is usually believed; and it should be done earlier than either the patient or the majority of physicians think necessary, just the same as a colostomy is the palliative treatment for cancer of the rectum. The author emphasizes the desirability of urging patients to submit to a gastrostomy earlier than is ordinarily considered necessary.

Another important point is the careful consideration of the anatomy of the tumor in relation to the normal anatomy of the esophagus. It is extremely rare to find an early case. The mode of spread of the tumor is such that it is able to reach extensive proportions without one's being able to detect it by any present method of examination. This extensiveness of the growth makes it so difficult to attack with radium. It may be that a combination of surgery and radium will produce better results. The surgeon by exposing the tumor may allow the radiologist to apply the radium more accurately.

Yankauer, Sidney. Radium in carcinoma of the esophagus. *Arch. Surg.*, January, 1926, xii (Part II), 247–256.

The method of application employed by the author is as follows: As soon as the diagnosis has been made by the esophagoscope and the distance of the carcinoma from the upper teeth has been measured, a gastrostomy is performed. During the time it takes for the tube to become free, the carcinoma has lost some of its inflammatory swelling. A string is then swallowed by the patient and fished out of the gastrostomy wound. If the patient cannot swallow the string, it may have to be pushed through with the esophagoscope. A radium chain is attached to this string. This chain consists of several links, preferably of platinum, although brass is permissible, in which the desired dose of radium is placed. The cavity in the links is about 1 cm. long and there is about 1 cm. space between the cavities. The author has used three links in the chain, thus covering an area 6 cm. long. The chain is covered with a rubber sleeve to cut out the short waves. A string is attached to the lower end of the chain and has a knot in it at the distance from the chain which corresponds to the distance of the upper end of the growth from the teeth. The gastrostomy string is then pulled down, drawing the radium chain along with it. A roentgenoscopic examination is made to confirm the exact position of the radium chain in the region of the carcinoma.

If small doses of radium are applied over a prolonged period there is danger of causing fibrosis of the surface of the carcinoma which may act as a screen and prevent a deeper action of the radium. For this reason the author has used larger doses, 100 mg-hr., the radium being applied for two or three days. The therapeutic results so far as relief is concerned seem to be good.

BOOK REVIEWS

Books are acknowledged under the heading: Books Received. This must be regarded as a sufficient return for the courtesy of the sender. Selections will be made for review in the interests of our readers and as space permits.

PHYSIOTHERAPY. By Harry Eaton Stewart, M.D., Attending Specialist in Physiotherapy, U. S. Marine Hospitals, New York. 8 vo. Pp. 351; 66 illustrations. Price $7.50. New York: Paul B. Hoeber, Inc. 1925.

The author of this new volume on physiotherapy, being one of the younger men in this field and trained in modern medicine, has written a book which is much more up-to-date in its consideration of pathology than others that have been written on the subject. As Assistant Director, Section of Physiotherapy, Surgeon General's Office, United States Army, and also Supervisor of Physiotherapy, Bureau of the United States Public Health Service during and after the war, Dr. Stewart had a valuable experience in formulating a consideration of physiotherapy that was not biased by over-enthusiasm.

In the introduction he speaks of what parts of this subject may be useful to the different specialties and, unlike most writers on physiotherapy, he does not claim that it is a necessary part of all procedures, but recommends small sections as being of possible use. He mentions in a specific way how different branches of surgery, such as industrial surgery, etc., can get good use out of physiotherapeutic methods. The chapters on the different modalities are not too scientific for the average medical reader, and go into great detail in explaining some of the basic properties of modalities, but not too deeply for the average clinician.

In speaking of galvanism, faradism and other low voltage currents, Stewart still sticks to the term "ionization" which it is hoped he will discard in later editions. This term has no place in electrotherapeutics, but has a distinct place in modern work with the *x*-ray.

Static electricity is gaining a more prominent place in general electrotherapeutics and a consideration of this modality could be lengthened out to be more explanatory. In the present edition it is sketchy and the subject is not as well explained as when the author considers high frequency electricity. All forms of high frequency are particularly well elucidated and the chapter should be readable by many who are not well versed in the science of electricity.

The author makes a distinction between phototherapy and actinotherapy, restricting the latter to the use of what used to be called the "actinic ray." Investigations of dictionaries conducted by the New York State Department of Education before the recent Medical Practice Act was submitted, showed that the term "actinotherapy" covers the entire subject of treatment with light and includes what Stewart calls "phototherapy." The other modalities used in physiotherapy, such as massage, exercise, hydro- and thermo-therapy are very well covered. The latter half of the book contains sketchy directions for the clinical application of the modalities mentioned in the first half. The author fully realizes that a great deal depends upon the brain work in the administration of these modalities and therefore seeks only to guide the thoughts of those who are interested, along the paths that should give them help in the treatment of the conditions mentioned.

While this work can be amplified, as it stands it is without equal in the field of physiotherapy, especially when considered as a subject for the interest of general clinicians.

NORMAN E. TITUS.

DIE OPERATIVE TECHNIK DES TIEREXPERIMENTES. Von H. F. O. Haberland, Dr. Med., A. O. Professor für Chirurgie an der Universität Köln. 8 vo.; 336 Seiten; 300 Abbildungen. Preis, Reichsmark 28.50. Berlin: Julius Springer, 1926.

There are but few volumes devoted to the subject of animal experimentation in which it is possible to get at a glance all of the essential facts necessary to successfully undertake operative experiments on animals. Haberland, professor at the University of Cologne, has compiled a volume that should be of the utmost value to those engaged in such work. The book is divided into three main sections. The first of these treats of the detailed anatomy of the various animals used in experimental laboratories. The second part is devoted to a discussion of the manner of housing and caring for the various animals, both in health and in disease, as well as a minute description of the preoperative technique. The third section is devoted to the description of the various surgical procedures, in great detail and with a profusion of excellent cuts and sketches. The volume is written in a clear, interesting manner.

La Cystographie. Étude Radiologique de la Vessie Normale et Pathologique. Par H. Blanc et M. Negro, du Service Cividale, Hôpital Lariboisière, Paris. 8 vo.; 189 pages; 108 figures. Paris: Masson et Cie, 1926.

Cystography forms a valuable adjuvant to the urological diagnostic armamentarium in cases in which cystoscopy is impossible, e.g., in certain tumors with irritable bladders. It is of value also in demonstrating before operation the relation to the bladder walls and the ureters of diverticula seen at cystoscopic examination. In determining the presence of ureteral fistulae or the incompetency of the ureteral closure, cystography is of prime importance. In other conditions, such as calculi, congenital malformations, etc., cystography, if not essential, may still be of value and of interest.

The authors have examined by this method all of the patients in the urologic clinic of the Lariboisière Hospital during the past four years. The results of their work are presented in the form of a very interesting atlas of urinary cystographs. The appearances of both normal and pathological bladders are represented by a series of beautifully reproduced roentgen photographs of bladders filled with sodium bromide. At the beginning of each series of photographs there is a brief discussion of the condition under consideration. The technique employed is given in detail. The volume is neatly prepared, and should make a valuable addition to the urologist's library.

Handbuch der Massage und Heilgymnastik. Von Dr. Med. Franz Kirchberg, Lektor für Massage und Heilgymnastik an der Universität Berlin; Dozent an der Deutschen Hockschule für Leibesübungen. Band ii. Massage und Gymnastik bei Erkrankungen der Einzelnen Organsysteme. 8 vo; 334 Seiten; 23 Abbildungen. Preis, M. 15. Leipzig: Georg Thieme, 1926.

In this second volume of his work on massage, the author discusses its special application to the various diseases of the different organ systems of the body. The book is intended as a guide to physicians in prescribing massage and in directing the work of the masseur. The chapters by Koch on the treatment of fractures and dislocations and that by Seele on the mechano-medical treatment of fractures are especially stimulating to the surgeon. With the growth of the physiological attitude and the increasing importance of mechanical methods in the treatment of disease, a book such as the present volume of Dr. Kirchberg should prove a valuable addition to the literature.

General Anesthesia. A Textbook for Students and Practitioners of the Art of Anesthesia. By James G. Poe, M.D.; Lecturer on General Anesthesia in the Medical and Dental Departments of Baylor University; Chief of Anesthetic Staff of Baylor Hospital, Dallas; also Consulting Anesthetist to the Shrine Hospital for Cripple Children and Parkland Hospital of Dallas; etc., etc. 8 vo.; 150 pages; illustrated. Published by the Author, 1926.

For those who are not desirous of reading the larger works on anesthesia, the small volume presented by Poe may be recommended. It is simple and concise and could serve very well as an abstract of the larger volumes on this subject. The most valuable part of the work is the author's division of the third stage of ether narcosis. He describes three subdivisions which are elaborately charted so that the reader can hardly fail to administer anesthesia safely. The book having been published by the author has not as workmanlike an appearance as those put out by experienced publishing houses. There are some few easily excusable typographical errors and there is a dearth of illustrative material.

The Modern Treatment of Hemorrhoids. By Joseph Franklin Montague, M.D., F. A. C. S., of the Rectal Clinic, University and Bellevue Hospital Medical College; Fellow, American Proctologic Society, New York Academy of Medicine, and New York Pathological Society. 8 vo.; Pp. 296; 116 illustrations. Philadelphia and London: J. B. Lippincott Company, 1926.

Montague's excellent monograph on hemorrhoids has been prepared primarily for the use of the general practitioner. The discussion of the medical treatment of this condition is preceded by descriptions of the etiology and pathology and the diagnosis of the various forms of hemorrhoids. In the matter of surgical treatment, the author definitely takes the stand that the injection treatment of uncomplicated internal hemorrhoids is a thoroughly justifiable, effective and surgical method. The various types of solutions that may be injected, and the whole technique is described in detail. For the more complicated

type of hemorrhoids the author favors the ligation and resection method. However, the technics of the clamp and cautery, the Whitehead and other operations are described. Complete details of the pre- and post-operative care of patients are given. The book is well illustrated and well bound. It should be of value in elucidating many of the vexing problems connected with the treatment of hemorrhoids.

Die Akuten Eitrigen Infektionen in der Chirurgie und Ihre Behandlung. Von Dr. med. Arthur Buzello, Privatdozent und Assistent an der Chirurgischen Klinik und Poliklinik in Greifswald. 8 vo.; 480 Seiten; 175 zum Teil mehrfarbigen Abbildungen. Berlin and Wein: Urban und Schwarzenberg, 1926.

Under this title, the author presents a large and interesting variety of infections of the different parts of the body. The first few chapters are devoted to a discussion of the general aspects of the subject, the question of inflammation and the reaction of the body to bacterial invaders. The bacteriology of these organisms and the rationale of Bier's hyperemia, roentgen-ray, vaccine and foreign protein treatment are discussed. In the special part of the work, attention is given to the different clinical pictures. These are briefly but interestingly presented. The broad general diagnostic and therapeutic indications are described with a wealth of illustration scattered throughout the text. The last portion of the volume is given over to a discussion of general blood infections by pyogenic, toxic or putrefactive organisms. The volume is intended primarily for the student, but may well prove of the utmost value to others further advanced. Unfortunately, there are not the great number of references to the literature which in such a work would prove of inestimable worth.